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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

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SUMMARY OF RECENT ABSTRACTS.*

VI. PLAGUE.

Epidemiology: Epizoology: Transmission.

MEYER (p. 549), in a valuable contribution, sums up the known facts of sylvatic plague, and discusses the problems that await solution. Localized epizootics in ground squirrels and prairie dogs of 12 Western States of the U.S.A. have been attributed to plague; these epizootics die away in winter if the rodents hibernate, but reappear periodically, and plague apparently persists indefinitely in the affected areas. Experimental work has shown variations in susceptibility of certain rodent species, and resistance is probably due to the survival of naturally resistant individuals, but immunity due to previous attacks cannot be ruled out. Fleas are essential to complete the propagation of plague in wild rodents, and the mode of transmission is the same as in rat plague.

The bacilli responsible for sylvatic plague in the United States are of the same biological type as those isolated from rats or rodents from other parts of the world. Any form of human contact with rodents in sylvatic plague areas is attended by a definite, though limited, risk of infection; the clinical features of disease so acquired do not differ from those of plague acquired from rats, and the case mortality rate has been approximately 50 per cent.

The unknown factors of plague are many: the mode of spread from region to region of America, sometimes when there are no obvious rodent contacts between them, is not clear; persistence from one season to another has not been explained; vaccination methods need further evaluation, and the value of different anti-rat measures needs elucidation.

The same author in a later paper (p. 834) discusses these matters in relation to the ecology of plague. He points out that although tularaemia may cause extensive epizootics in rabbits and hares in California, squirrels are rarely involved, and that in recent years every true epizootic in squirrels has been caused by plague. At least 31 species of rodents are incriminated in the 12 Western United States

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1942, Vol. 39. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

known to be affected. The author refers to the terms "infection potential," "vector potential" and "transmission potential" described by WHEELER and DOUGLAS below, pointing out that these apply to other rodent fleas as well as to rat fleas. He notes that in sylvatic plague, focal occurrence and discontinuous distribution of the disease are characteristic; these features have not been satisfactorily explained.

CREEL (p. 303) gives an account of the plague situation in North America. The extension of the disease through the ground squirrel population has been slow, but unless control is effected it may spread to the rat populations of cities. The main reservoir is probably the ground squirrel population, and rodents such as the chipmunk, marmot, wood rat and prairie dog probably do not have the density of population essential for the maintenance of an enzootic reservoir. For control, the laboratory examination of rodents is essential and must be continuous, but the author estimates that with proper methods plague could be eliminated within five years by a campaign directed, not against all rodents, but against ground squirrels only. If the matter is neglected, spread to the Eastern States may be expected.

In *Public Health Reports* (p. 303) it is noted that infection has been found in fleas from ground squirrels as far east as N. Dakota.

WHEELER and DOUGLAS (p. 616) point out that to evaluate the efficiency of an arthropod in the transmission of plague it is necessary to estimate the infection potential (proportion which become infected), the vector potential (proportion of infected individuals which actually transmit) and transmission potential (number of animals infected by one infective arthropod). They have calculated these figures for *Ceratophyllus montanus* and *Xenopsylla cheopis*.

Xenopsylla cheopis was originally found only in the seaports of the United States; RUNNER (p. 307) now reports that it has been found permanently established at certain places in the interior of the country. In Vancouver, British Columbia, the *X. cheopis* index of two groups of rats was 2·17 and 3·42 (HOLLAND, p. 306), but no plague has yet been reported from that Province.

STEWART and EVANS (p. 616) state that in California *Hoplopsyllus anomalus* is probably not so efficient a vector of plague as *Ceratophyllus montanus*, both of which are found on *Citellus beecheyi*. They have found that fleas collected at the mouths of rodent burrows give a highly accurate representation of the flea population of the rodents themselves. *C. montanus* predominates when the mean temperature is below 75°F., and *H. anomalus* when it is above. Surveys from burrow mouths may therefore be expected to furnish information as to the appropriate time to begin prophylactic measures against sylvatic plague.

WHEELER *et al.* (p. 307) show that the flea *Echidnophaga gallinacea* is a parasite of ground squirrels in California; it also attacks the burrowing owl, which itself is closely associated with the ground squirrel. This flea, collected from the owl, has been found infected with *P. pestis*, and this finding serves to show that the owl may be closely associated with the spread of plague.

MOLL and O'LEARY (p. 303) state that in Ecuador plague has been eradicated from ports and lowland towns, but persists in some mountain areas. In the railroad towns rats and *X. cheopis* were implicated, but in the mountains the guineapig is the reservoir. Here the hygienic habits of the people are bad, and it is thought that *Pulex irritans*, the

human flea, is the chief transmitting agent. The disease, under these conditions, however, is rather endemic than epidemic, and the incidence is not high. In Peru, on the other hand, plague is associated with the rat, and the sylvatic form has not been reported. Important foci are found in the small villages; the majority of cases are of the bubonic form.

De la Barrera (p. 305) records the occurrence of plague in three persons who had caught and skinned hares in the Province of Mendoza, Brazil. In each case axillary buboes developed.

In Argentina plague is sylvatic in origin, and d'Amato (p. 763) states that most infected persons have been in contact with wild rodents, but points out also that domestic rats are frequently involved. Control work is carried out by travelling brigades which attack domestic and semi-domestic rodents. Lobo and Silvetti (p. 305) report an outbreak of sylvatic plague in Tucumán, Argentina, in which field rodents and *R. alexandrinus* were involved, and which led to at least 36 human cases in a period of 9 months. The rodents and fleas implicated are named.

Pardal (p. 762) describes a small outbreak of pneumonic plague which apparently took its origin from diseased field rodents. No rats were involved, but the first human case was probably caused by an infected cat which itself had probably received its infection from field rodents.

Gale (p. 302) reports an outbreak of pneumonic plague in an African reserve in the Kalahari. The origin was doubtful, but the multimammate mouse (*Mastomys coucha*) or the springhare (*Pedetes caffer*) may have been implicated. The epidemic involved 37 persons, of whom 36 died, yet, in spite of the close contact existing between the sick and the healthy, the outbreak was not so extensive as might have been expected, and was short-lived. Vaccination was adopted as a control measure, but it is not clear to what extent it was effective.

Vint (p. 687) states that in Kenya there is no evidence to show that wild animals other than rats harbour plague.

Sokhey (p. 300) notes that in Bombay rats a steady reduction in susceptibility to plague took place between 1931 and 1936, but that by 1939 susceptibility was beginning to increase. He describes a serological test of agglutination of organisms contained in suspensions of liver or spleen of rodents dead of plague, which may be valuable in diagnosis of the disease even in animals whose organs have become putrid.

In discussing the examination of rats for plague Vint (p. 687) notes that it is useless to expect plague in rats caught in baited traps; the plague rat is sick and is not attracted to bait. Dead rats are often decomposed when found, and in that case bone marrow should be examined.

Henriques (p. 551) gives detailed instructions for the methods which should be adopted in the collection, transmission and examination of rats and fleas for plague, and a brief note on the bacteriological standards used in the identification of plague bacilli. These notes cannot be further abstracted.

Clinical Findings: Diagnosis: Treatment.

Vint (p. 687) considers it a mistake to classify plague into the forms bubonic, septicaemic and pneumonic. In the bubonic form there

is an initial, though transient, bacteriaemia, and there is always a terminal septicaemia in fatal cases; pneumonic plague ends by becoming septicaemic.

WRIGHT (p. 688) notes that in the recent outbreak of plague in Kenya cases were seen in which diphtheria or Ludwig's angina were simulated, or in which lesions of the skin and subcutaneous tissues resembled carbuncles, or in which cerebral symptoms pointed to a brain lesion.

GOLDSTEIN (p. 689) points out that the diagnosis of pneumonic plague may be difficult, and in the earliest stages there may be little to be found except a marked discrepancy between the almost negligible physical signs and the gravity of the patient's condition; yet there are remarkable exceptions to this rule. Sputum is typically scanty at first, becoming thin and bloodstained, and containing large numbers of *P. pestis*; but sputum may remain negative, and may be sticky and mucopurulent. Severe abdominal pain may be present, the pulse rate may be low and the respiration rate no more than 36–40. The finding of *P. pestis* in sputum or lung puncture material is a sign of bad prognosis.

DE SMIDT (p. 688) gives instructions on the laboratory diagnosis of plague. Material from buboes must be taken from the gland substance, not from the surrounding oedematous tissue. Staining reactions of pneumococci and Friedländer's bacillus may simulate the bipolar appearance of *P. pestis*, but culture easily differentiates these organisms. In post-mortem material spore-bearing organisms may stain with a bipolar effect, but are always Gram-positive. The typical post-mortem signs in rats are an enlarged, engorged, dark, friable spleen; red serous membranes of dull lustre with petechial or diffuse haemorrhages; blood-stained fluid in the pericardial, pleural and peritoneal sacs; enlargement of the suprarenals; enlargement and engorgement of the liver, sometimes with white miliary foci of necrosis; enlargement of glands, especially in the cervical region.

LOBO and SILVETTI (p. 305) point out that in plague the bacilli can be isolated in culture from the bone marrow of the second or third phalanx of the human finger, though they may not be visible on direct smear. In treatment these authors favour plague serum, but they have found little value in Argentina from efforts at prophylaxis by means of vaccines or sera.

ALVARADO (p. 689), referring to the difficulty of post-mortem diagnosis of plague in isolated regions remote from medical services, advocates the amputation of a finger from the cadaver of any person who has died of an acute illness of less than 10 days' duration, in an area where plague may be suspected. The finger is sent dry to the laboratory, where examination of the bone marrow is carried out. The author envisages a service similar to the viscerotomy service in the control of yellow fever.

PLUM (p. 687) reports that, in a period of 12 months, 547 cases of plague were admitted to two hospitals in Nairobi, Kenya. At one hospital, where most of the cases were pneumonic or septicaemic, 127 of 134 patients died; at the other hospital, where there were few pneumonic or septicaemic cases, 227 of 413 patients died. In the opinion of the author, sulphapyridine, if used in sufficiently large and frequent doses, acts almost as a specific in the bubonic form of the disease.

In a survey of the work of the Haffkine Institute for 1939, SOKHEY (p. 300) states that sulphathiazole and sulphapyridine have powerful

curative action which may best be measured when septicaemic plague only is considered. The trials at that time had been relatively few, but there was a clear indication of advantage over the standard iodine treatment, and even over serum treatment. In mice, sulphathiazole appears to be more effective than sulphapyridine.

GIRARD (p. 308) has used sulphonamides successfully in the treatment of plague in animals and man. He reports favourably on sulphapyridine and advises daily doses of 6 to 10 gm. during the febrile period ; after the temperature has fallen the drug should be continued in daily dosage of 1 to 2 gm. for 12 days. In animals sulphapyridine proved more effective than serum.

DE VILLAFAÑE LASTRA *et al.* (p. 309) record an outbreak of plague in the Province of Córdoba ; of 70 patients with bubonic plague 54 per cent. died, of 35 with pneumonic disease all died. Treatment with sulphathiazole was given to three subjects with the bubonic form ; the results were good.

Vaccination : Control.

In discussing the use of a live vaccine in plague, OTTEN (p. 309) draws attention to the fact that any vaccine will protect certain animals such as the white rat, the mouse and the monkey, but that this is not so with the guineapig and the house rat. In these two animals the live, avirulent vaccine proved its superiority over dead vaccines. The Tjiwidej strain, originally from a house rat, was kept as usual at 5°C. in deep serum agar stab culture, and in four months had entirely lost its virulence ; passage through rats failed to re-establish virulence. More important, however, was the fact that this strain possessed high immunizing power for susceptible animals. Avirulent strains are variants by dissociation, but the form of the colony gives no indication of the loss of virulence. The change is apparently irreversible, but single colony isolation is essential for certainty. Avirulent strains other than Tjiwidej have been isolated, and some are particularly effective in rats, others (such as the E. V. strain) in guineapigs. Otten considers that man behaves like the house rat, rather than like the guineapig, in regard to immunization, and in man he claims that the results achieved with live vaccine have demonstrated its great advantage over killed vaccine. He gives figures which show the great reduction in mortality in the vaccinated as compared with unvaccinated controls.

PIRIE and GRASSET (p. 311) report that two South African avirulent strains of *P. pestis* are about equal to the Tjiwidej strain in immunizing power for rats, and that the E.V. strain is rather less potent [see Otten above, who states that the E.V. strain is more effective in guineapigs].

GRASSET (pp. 311, 312) uses a mixture of the Tjiwidej and E.V. strains, since it is not definitely known what is the human response to each of these two immunological types. No sign of reversion to original virulence has been seen, but the danger is that the strains may lose immunizing power. In man local reactions to inoculation are not great, and the temperature usually remains normal.

GIRARD (p. 763) holds that not every avirulent strain of *P. pestis* will make an efficacious vaccine, and claims that three characters are essential :—(1) Normal growth, especially in broth. (2) Persistence of some degree of virulence, enough to cause local nodule formation in

guineapigs injected with 1,000–2,000 million organisms. (3) Persistence of some toxicity, so that filtered extracts after the cultures have been frozen and thawed (technique of Gory and Grasset) will kill mice in 8–36 hours after injected doses of 1/20 to 1/4 cc.

In the Annual Report on Plague in Java for 1939 (p. 552) it is recorded that by the end of that year over 1½ million houses had been improved (that is, had been so altered that rat harbourage was reduced) and that almost one million new buildings on approved anti-rat designs had been erected. The number of cases of plague had fallen by about one-quarter of the number seen in the previous year; this fall seems probably to have been due to the increased use of the live Otten vaccine for primary inoculation and reinoculation (over 9 million injections have now been given), and to the late appearance of the rainy season in the year under discussion.

DONOVAN and HOPKINS (p. 312) describe the use of the flame-thrower for killing rats and fleas. This can be used not only for burrows, but also for killing rats, fleas and other insects in cracks and crevices of walls and, indeed, for the control of any insect which passes part of its life in the walls or floors of houses. It has a use, therefore, in typhus, Chagas's disease and relapsing fever. *Charles Wilcocks.*

MALARIA.

LIMA (Firmino de Oliveira) & DOS SANTOS (Israel Alves). Quatro casos autóctones de malária quartã, no município de Itaporanga, Estado de São Paulo. [**Four Autochthonous Cases of Quartan Malaria in Itaporanga in the State of São Paulo.**]—*Arquivos de Hig. e Saúde Pública.* São Paulo. 1942. May. Vol. 7. No. 15. pp. 113–119. With 4 figs. on 1 plate. English summary (4 lines).

Quartan malaria has rarely been reported from the south of Brazil, a fact which endows with interest the four cases now described. All four patients were inhabitants of the State of São Paulo. The microscopic findings were typical of *P. malariae*, a diagnosis which is supported by the microphotographs published. One of the four patients had a typical quartan fever. *Norman White.*

LAVRENKO (E. M.). [**Morphological Differences in the Larvae of Subspecies of** *Anopheles maculipennis.*]—*Med. Parasit. & Parasitic Dis.* Moscow. 1942. Vol. 11. No. 3. pp. 30–39. With 10 figs. [In Russian.]

The author describes a method for the identification of races of *Anopheles maculipennis*, based on the chaetotaxy of the abdominal segments in the larvae, and especially on the average number of branches in the hairs. The differential characters—dealt with in

detail and illustrated—are set forth in the accompanying table, in which the numerals for the hairs are those used in Martini's scheme :—

Average Number of Branches in Hairs of the Abdominal Segments in Larvae of Races of A. maculipennis.

Hair Numeral	Number of Abdominal Segment	Races of Larvae		
		atroparvus	*typicus*	*messeae*
1	I	9	10	11
	II	13	16	12
	III	18	18	19
	IV	18	19	19
	V	18	18	18
	VI	17	18	18
	VII	16	18	18
2	I	6	7	8
	II	8	9	10
	III	7·5	7·5	9
	IV	3	4	5
	V	2·5	3·5	5
	VI	1	1	1
	VII	5·5	6	7
3	I	1	1	1·5
	II	5·5	5·5	6·5
	III	4·5	4·5	5·5
	IV	5	4·5	5
	V	4	4	5
	VI	3·5	5	6
	VII	3	3	3·5
4	I	6	6·5	7
	II	1	1	1
	III	1	1	1
	IV	3	3	3
	V	1	1·5	1
	VI	1	1	1
	VII	1	1	1
5	I	6	6	7
	II	9	9	11
	III	10	9	10·5
	IV	7	7	8
	V	7·5	7	7
	VI	7·5	7	8
	VII	7	7	8

C. A. Hoare.

BEKLEMISHEV (W. N.). [**Comparative Study of Life-Histories of Blood-Sucking Arthropods.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1942. Vol. 11. No. 3. pp. 39–44. [13 refs.] [In Russian.]

The author gives an outline of comparative ecology and parasitology of some blood-sucking insects, based mainly on researches carried out by the Entomological Department of the Central Institute of Malaria, Moscow.

The life-history of *Anopheles maculipennis* was investigated in greatest detail, and served as a model for the study of the bionomics of other haematophagous insects.

Owing to its obligatory haematophagy and predatory habits the female *A. maculipennis* concentrates from distant places for attacks on large gregarious mammals, while ignoring individual small mammals dispersed in the same locality. At the same time this mosquito scatters widely in search of suitable water collections for oviposition. In connexion with these habits this species is highly mobile and has a wide range of flight. The exposed life led by its larvae involves a high mortality rate among them, but this is compensated by a high fertility rate of the female. However, in accordance with its mobile habits, the female does not lay all the eggs simultaneously in a single large batch but repeatedly and in small batches. The adult females also run many risks in their long flights in search of food and their death-rate is therefore high. On the other hand, a single blood meal ensures the complete development of at least one batch of eggs. The life-history of these mosquitoes, being characterized by gonotrophic harmony and by a repetition of the gonotrophic cycles, is well adapted to their ecology. These cycles constitute a gonotrophic rhythm covering the entire imaginal period of existence of the female and governing all its vital functions.

The life-history of *A. maculipennis* is compared with that of *A. bifurcatus*, Aëdes, sandflies, horse-flies, Stomoxys, *Musca larvipara* (blood-licker) and tsetse flies, which are dealt with briefly.

C. A. Hoare.

COCHRANE (E.). **Notes on** *A. argyritarsis* **and** *A. pseudopunctipennis* **in Grenada.**—*Caribbean Med. Jl.* 1942. Vol. 4. No. 3. pp. 97–100.

BRITISH GUIANA. REPORT OF THE DIRECTOR OF MEDICAL SERVICES FOR THE YEAR 1941 [PEARCE (A. H. B.), Director (Acting)]. Appendix III. pp. 10–14. **Summary of the Work of the Malaria Research Unit for the Year 1941** [BEVIER (George)].

British Guiana has an average annual rainfall of about 90·5 inches, in the coastal region. There was a relative drought from September 1938 to June 1941. Deficits of rainfall amounted to 5·7 inches in the last four months of 1938, 24·8 inches in 1939, 21·6 inches in 1940, and 21·9 during the first five months of 1941. Thereafter each month of 1941 except December had rainfall in excess of the 60 year average.

During 1940 the prevalence of *A. darlingi* (the only important malaria vector) diminished in a remarkable manner. Only 76 larvae were captured during the last nine months of that year in the coastal region ; 46 of these came from the east bank of the Demerara. Adult *A. darlingi* disappeared at the same rate but several weeks later ; only four specimens were taken during the last three months of the year. In June 1941, some weeks after the heavy rain started, *A. darlingi* reappeared : 153 adults were captured at Lusignan and 196 more during the next six weeks. Elsewhere they were not numerous. Of the 1,634 adults captured during the year 1,373 were taken in Lusignan. All but four specimens came from a small area 8 to 12 miles east of Georgetown.

The disappearance and reappearance of *A. darlingi* during and after the drought, and the fact that in normal times the distribution of the

species is patchy, endow with special interest the inquiry now in progress into the conditions favouring the breeding of this species. Larvae have been found in waters with a *p*H of 4·5–7·3 and a salt content of from 0·028 to 0·126 gm. per litre.

Figures denoting parasite and spleen rates and malaria incidence were not available when the report was written ; these should be of interest. There had been no severe outbreak of malaria following the reappearance of *A. darlingi* but it is considered that such an outbreak is likely to occur when *A. darlingi* becomes prevalent once more. Returns from hospitals and dispensaries of the Sugar Producers' Association show that the incidence of malaria in 1940 was less than half that of the previous year.

Anopheles other than *A. darlingi* found in this area are *A. tarsimaculatus*, *A. albitarsis*, *A. triannulatus* and *A. apicimacula*.

Norman White.

CORRÊA (Renato R.) & RAMOS (Alberto S.). Os anofelinos da região meridional do Estado de São Paulo. [**Anophelines of the Southern Region of the State of São Paulo.**]—*Arquivos de Hig. e Saúde Pública* São Paulo. 1942. May. Vol. 7. No. 15. pp. 35–57. With 1 map & 11 figs. on 5 plates. [12 refs.] English summary.

A great extension of malaria in the southern part of the State of São Paulo in the early months of 1941 prompted the anopheline survey which is reported in this paper. The area surveyed lies between 23° and 25° S. and 48° and 50° W. It contains two topographically distinct regions, an Atlantic coastal area separated by mountains from high uplands. Thirteen of the 38 species of Anopheles that have been reported from Brazil were found during the survey ; these were *A. albitarsis*, *A. argyritarsis*, *A. darlingi*, *A. oswaldoi*, *A. pessoai*, *A. strodei*, *A. triannulatus*, *A. peryassui*, *A. fluminensis*, *A. intermedius*, *A. pseudomaculipes*, *A. lutzi* and *Chagasia fajardoi*. *A. strodei* was the most widely distributed : it was specially prevalent at high altitudes, 1,050 metres. In many places *A. darlingi* was predominant among Anopheles captured in houses ; at Ribeira oöcysts were found in two of 33 *A. darlingi* dissected. Two of 24 *A. oswaldoi* var. *metcalfi* (*tarsimaculatus* Root) dissected were found infected. Good illustrations depict the characteristics of the eggs of *A. strodei*, *A. darlingi* and of *A. oswaldoi*, larval characteristics of *A. oswaldoi* and the terminalia of *A. fluminensis*. *Norman White.*

CORRÊA (Renato R.) & RAMOS (Alberto S.). Relatório das investigações entomológicas realizadas na represa de Light e ao longo da E. F. Sorocabana, Ramal Mayrink-Santos. [**Entomological Investigations between São Paulo and Santos.**]—*Arquivos de Hig. e Saúde Pública*. São Paulo. 1942. May. Vol. 7. No. 15. pp. 311–333. With 1 folding map & 12 figs. on 4 plates.

This is a record of an anopheline survey carried out in and around the impounded waters in the Light and Power Company's Reservation near the sources of the Rio Grande, Rio des Pedras and Rio Pereque, between São Paulo and Santos. Collections were made of anopheline larvae and adults. The number of adults captured was small ; this

fact is ascribed to the relatively low temperatures prevailing—the survey was carried out between July 21st and September 19th. Larvae identified were *A. strodei* 1,813, *A. albitarsis* 1,188, *A. pseudomaculipes* 11, *A. argyritarsis* 1, *A. darlingi* 5, *A. cruzi* 3, and *A. pessoai* 7. The 125 adults captured included *A. strodei* 21, *A. albitarsis* 78, *A. pseudomaculipes* 16, *A. cruzi* 8 and *A. lutzi* 2. The scarcity of *A. darlingi* was apparently seasonal; this species was said to have been very prevalent in this area in the early months of 1940 and 1941. *A. cruzi* larvae were found in water at the base of leaves of bromeliads which extensively parasitize trees in the area. [In Trinidad *A. bellator* breeds exclusively in this collection of water, see this *Bulletin*, 1942, Vol. 39, p. 664.] *Norman White.*

RACHOU (René Guimarães). Relatório sobre o recenseamento realizado na represa Rio Grande. [**Examination of the Population at the Reservoirs of the Rio Grande.**]—*Arquivos de Hig. e Saúde Pública.* São Paulo. 1942. May. Vol. 7. No. 15. pp. 241–250. With 1 map.

Simultaneously with the anopheline survey carried out by CORREA and RAMOS at and around the hydro-electric power source of the Rio Grande (see above) the author carried out a survey of the resident human population. He visited 234 houses, and saw 798 individuals, mostly belonging to the Light and Power Company, but some to the Telephone Company. The inspection included the examination of 1,598 blood smears. Only 21 of the 798 persons examined were found to harbour malaria parasites, 17 of these *P. vivax*, 4 *P. falciparum*. Twenty-seven per cent. of the persons examined gave a history of past malaria; one-third of these had suffered from clinical malaria, believed to have been contracted locally, during the year in which the survey was carried out. *Norman White.*

UNTI (Ovidio) & RAMOS (Alberto S.). Anofelismo das alturas no Brasil meridional. [**Anophelines of High Altitudes in Southern Brazil.**]—*Arquivos de Hig. e Saúde Pública.* São Paulo. 1942. May. Vol. 7. No. 15. pp. 89–106. [39 refs.] English summary.

This paper is prefaced with summarized information concerning the reported prevalence of many species of Anopheles at very high altitudes in many countries of Asia, Africa and Central and South America. Comparable information concerning the anopheline fauna of high altitudes of Brazil not being available the authors have started to make good the deficiency. Their studies were carried out in the mountain ranges of Mantiqueira and Mar and the off-shoots in the States of São Paulo and Minas Geraes. There does not appear to be any endemic malaria at present in any of these high regions. *A. lanei* was found breeding at a place 1,570 metres above sea level in company with *A. strodei*, *A. lutzi*, *A. parvus* and *A. argyritarsis*. *A. argyritarsis*, *A. albitarsis*, *A. strodei*, *A. lutzi*, *A. parvus* and *A. cruzi* were found in many localities at heights ranging from sea level to 2,000 metres. *A. darlingi* was found up to 1,000 metres but not higher; *A. maculipes* had a similar distribution. Of all anophelines *A. strodei* was most in evidence everywhere. Eggs of a variety of *A. oswaldoi* were found at 1,100 metres. *Norman White.*

UNTI (Ovidio). Notas ecologicas sobre anofelinos do Vale do Paraiba. [**Ecological Notes on the Anophelines of the Paraiba Valley.**]—*Arquivos de Hig. e Saúde Pública.* São Paulo. 1942. May. Vol. 7. No. 15. pp. 11–21. With 1 map. English summary.

The Malaria Prevention Service of the State of São Paulo has installed, at Guaratinguetá in the Paraiba Valley, an experimental station, whose main function it will be to study the phenomenon of anophelism without malaria. As a first contribution to this study the author reports the *p*H and chlorine content of the waters in which larvae of *A. albitarsis*, *A. strodei* amd *A. argyritarsis* were found. The chloride content, expressed in terms of chlorine, of these breeding places was low, ranging from 0·00301 to 0·0458 per thousand parts. In waters in which no larvae were found the proportions were from 0·009115 to 0·0466 per 1,000 parts [hardly significant differences]. The *p*H of the water in all but two of the breeding places was between 6·0 and 6·8. In two it was 7·0. The most important breeding places are lagoons on both banks of the river, from 20 to 100 metres in circumference, with water of a maximum depth of 50 cm., and with exuberant aquatic vegetation. *Norman White.*

UNTI (Ovidio). O pH dos solos e dos focos de *Anopheles* e a epidemiologia da malária no Brasil. [**The *p*H of Soils and of Anopheles Breeding Places and the Epidemiology of Malaria in Brazil.**]—*Arquivos de Hig. e Saúde Pública.* São Paulo. 1942. May. Vol. 7. No. 15. pp. 121–158. With 1 map. [35 refs.] English summary.

This is a record of the results of the determination of the *p*H of some 3,000 samples of soils and water in areas in the States of São Paulo, Minas Geraes and Rio de Janeiro, in which Anopheles abound. In some of these areas malaria is hyperendemic; in others malaria is absent in spite of the presence of anophelines. The geological formation of the different areas is briefly described—there is a geological map of the State of São Paulo and the anopheline fauna of the different localities is detailed. A summary of such a mass of information is not possible. This is a matter of small moment because it does not appear that *p*H explains any of the vagaries of anopheline and malaria distribution in Brazil. All the Anopheles species, whether vectors or not, can breed in waters with a *p*H ranging from 6·2 to 7·5. Certain species display preferences: a *p*H of 6·0 to 6·6 is favoured by *A. albitarsis* and *A. oswaldoi*; 5·6 to 7·0 by *A. argyritarsis*; while *A. darlingi*, a potent vector, has a marked preference for neutral or slightly alkaline water. *A. strodei* seems to have no preferences in this matter. In the malaria-free Paraiba Valley *p*H findings, geological conditions, and the anopheline fauna can all be matched in some notoriously bad malarial regions. *Norman White.*

FONSECA (J. A. B.). Considerações sobre a *Anopheles* (*Anopheles*) *eiseni* Coquillett, 1902, como transmissor da malária humana. [*Anopheles eiseni* **as a Vector of Human Malaria.**]—*Arquivos de Hig. e Saúde Pública.* São Paulo. 1942. May. Vol. 7. No. 15. pp. 73–87. With 5 figs. on 3 plates.

The author describes the successful laboratory infection of *A. eiseni* with *Plasmodium falciparum.* In the majority of the experiments the mosquitoes were kept at laboratory temperature, which varied from

18° to 25°C. Among these oöcysts were found. The lot of mosquitoes in which sporozoites in the salivary glands were found were kept at a temperature of 25° to 27°. The gland infection was noted on the 11th day after the infecting feed. *A. eiseni* showed a slight preference for the blood of the tico-tico [a small Brazilian bird resembling the sparrow] and of man as compared with that of the horse, guineapig, cattle and fowl, but it is not an avid blood-sucker of any of these animals. For this reason it is unlikely to be an important vector of malaria though it might act in that capacity on occasion. *Norman White.*

DA FONSECA (Flavio) & CORRÊA (Renato R.). Infeção experimental de *Anopheles* (*kerteszia*) *cruzi* pelo *Plasmodium vivax*. [**Experimental Infection of** *Anopheles cruzi* **with** *Plasmodium vivax*.]—*Mem. Inst. Butantan.* 1941. Vol. 15. pp. 91–98. With 2 figs. on 1 plate. English summary.

Anopheles (*Kerteszia*) *cruzi* has long been suspected as a potential vector of malaria but proof is lacking. Laboratory bred *A. cruzi*, derived from eggs laid by wild mosquitoes caught on the Ilha de Santo Amaro in the State of São Paulo, were fed on patients whose peripheral blood contained *P. vivax* gametocytes. Twenty-nine such mosquitoes were subsequently dissected: one stomach and one salivary gland infection were found, 5 days and 18 days respectively after the infecting feed. *Norman White.*

ECKSTEIN (A.). Störungen der Ernährung, des Stoffwechsels und der Verdauungsorgane bei der Malaria des Kindes. [**Disorders of Nutrition, Metabolism, and the Alimentary Tract in the Malaria of Children.**]—*Ann. Paediatrici.* 1942. July. Vol. 159. No. 1. pp. 25–56. With 7 figs.

"The younger the child, the less characteristic are the manifestations of malaria." The author, writing from Ankara, describes the following types of disorders in children infected with malaria.

(1) *Symptoms almost negligible;* but slight splenic enlargement, fever and anaemia may be detected by close observation.

(2) *Dystrophic;* with failure to gain weight, stunting of growth and anaemia. In older children delayed puberty and infantilism may be the chief features.

(3) *Intestinal;* with dyspepsia and enteritis.

(4) *Other diarrhoeic or dysenteric types;* with (*a*) toxicosis (chiefly in infants), (*b*) biliary symptoms, (*c*) typhoid-like symptoms, (*d*) concomitant typhoid which has lighted up an existing malaria infection.

(5) *Acute abdominal;* simulating gastritis, appendicitis or peritonitis. The sudden onset of acute abdominal pain with rigidity and high fever often suggests the need for immediate operation unless a thorough search is made for parasites.

(6) *Nephritic;* with pronounced oedema and albuminuria. This is most frequent in quartan malaria, but the only case seen by the author in the present series was due to malignant tertian infection.

(7) *Cirrhotic* (*liver*). The author and his colleague have seen no less than 103 cases of malarial cirrhosis of the liver in children. Of these 14 were in children between the ages of two and five years, and 35 in children of six to ten years old. No description is given of the

type of the disease or of its symptoms, but the association with malaria is said to be undoubted. Treatment was unsatisfactory and all that could be done was to relieve ascites by tapping.

(8) *Disturbance of the carbohydrate metabolism.* The blood sugar was greatly increased in two of the sixteen cases of malignant tertian infection in which this point was investigated. There was no sugar in the urine in any of the cases.

In congenital and infantile malaria the manifestations are especially likely to be aberrant and to give rise to errors in diagnosis.

John W. D. Megaw.

ECKSTEIN (A.). Malaria und Zentralnervensystem im Kindesalter. **[The Central Nervous System in the Malaria of Children.]**—*Ann. Paediatrici.* 1942. Vol. 158. No. 2/3. pp. 65–96.

The disorders of the nervous system in the malaria of children were found by the author to belong to the following types. Except when otherwise stated the infections were malignant tertian.

(1) *Pre-comatose*: sudden severe headache may be the only manifestation of the disease, usually there are also splenic enlargement and fever. In one of the two cases described no parasites were found on the first day of observation but numbers of rings were found on the next day.

(2) *Comatose*: (*a*) *With Insidious Onset,* after several days of fever. In one of the two cases described the pressure of the cerebrospinal fluid was greatly increased: rapid improvement followed intramuscular injections of quinine. The other patient died a few hours after intravenous and intramuscular injections of quinine. (*b*) *With Sudden Onset* (the " sunstroke " type): In this type the onset was with high fever and convulsions. Two cases are described; in both there was increased pressure of the cerebrospinal fluid which also showed an increase in the cell count and the sugar content. Both of the patients recovered after intramuscular quinine. (*c*) *Meningitic type,* simulating tuberculous or cerebrospinal meningitis. In all the four cases investigated the cell count and sugar content of the cerebrospinal fluid were increased, and the pressure of the fluid was increased in three. In one of the cases no parasites were found in the blood on the eighth day, but numerous rings were found on the following day; this patient died in spite of intramuscular and intravenous quinine but the other three recovered with the same treatment. (*d*) *Encephalo-Meningitic type.* Signs of encephalitis usually appeared after those of meningitis, but in two out of seven cases they preponderated from the outset. In the two cases described no parasites were found on the first examination but numerous rings were seen on the next day. One of the patients died rather more than twenty-four hours after the first injection of quinine, the other recovered. In both the cerebrospinal fluid showed increases in the pressure, cell count, and sugar content, but the blood sugar was low. (*e*) *Epileptic type,* becoming comatose. One case is described in which a girl of eight years had a history of unaccountable deterioration in behaviour for fifteen days; then, suddenly, she had a severe epileptic seizure followed by frequent fits, and then a frank status epilepticus. There was a prompt response to intramuscular atebrin.

(3) *Neuritic.* In one of the three cases described the parasites were benign tertian. The neuritic manifestations were varied in type.

(4) *Hemiplegic.* A child of two years suddenly developed convulsions with paralysis of the left arm and leg. Infantile paralysis was suspected and on the first examination no parasites were found, but the fever was tertian in type, and after repeated searches benign tertian parasites were found and a complete cure followed a course of atebrin ; there was no evidence of paralysis four weeks later.

(5) *Neuropathic.* In four cases of children ranging from three to eleven years old, the chief manifestations were unexplained changes in disposition (nervousness, temperamental deterioration, hysterical outbursts, etc.). In one of these the parasites were benign tertian.

(6) *Psychotic* : with delirium or manic-depressive symptoms.

The great importance of repeated blood examinations is stressed if serious mistakes in diagnosis are to be avoided. *John W. D. Megaw.*

WINGFIELD (Alec). **Treatment of Malaria in England.**—*Brit. Med. Jl.* 1943. Apr. 17. pp. 476–477.

During 18 months 60 patients suffering from malaria were admitted to the Seamen's Hospital, London ; 57 were *P. falciparum*, 2 *P. vivax*, and 1 *P. malariae* infections. Most of the *P. falciparum* infections were contracted in Sierra Leone. All the patients were restored to health. As is usual in such a series of patients, many of whom had been, or were, taking quinine, the symptoms were many and varied and often but little indicative of the malarial nature of the disease. The treatment adopted in most of these cases was very thorough : first week, mepacrine [atebrin] 0·1 gm. thrice daily and quinine 5 grains twice a day ; second week, quinine 5 grains, twice a day ; third week, the first week's treatment repeated. If crescents were present in the blood after the termination of this course pamaquin [plasmoquine] 0·01 gm thrice daily was given for from three to five days. All patients received adequate doses of iron. In the few patients seriously ill on admission, including one of cerebral malaria, unconscious with high fever, quinine was given intramuscularly with " dramatic results " ; it was never necessary to give more than two such injections. Parasites were found in 42 patients on the first examination ; in 13 on the second examination. In two patients parasites were only found after the subcutaneous injection of adrenalin. No prolonged follow-up of these patients was possible : the average stay in hospital was 27 days. *Norman White.*

CARMAN (J. A.). **The Treatment of Malaria with Special Reference to Recent Literature.**—*East African Med. Jl.* 1943. Jan. Vol. 20. No. 1. pp. 4–14.

This is a critical review of some of the papers already reviewed by WHITE [this *Bulletin*, 1942, Vol. 39, p. 801]. The author's views are in general agreement with those expressed by HILL in that review ; he has seen little evidence of toxicity of mepacrine. *C. W.*

CODA (David). Observações referentes a quimioprofilaxia da malária (método de Ph. Décourt.) (1a. contribuição.) [**Observations on the Chemicoprophylaxis of Malaria (Decourt's Method).**]—*Arquivos de Hig. e Saúde Pública.* São Paulo. 1942. May. Vol. 7. No. 15. pp. 159–221. [12 refs.] English summary.

The author describes his experience in the suppressive treatment of malaria on the lines advocated by Ph. DECOURT in several publications.

[A summary of one of these papers, in this *Bulletin*, 1939, Vol. 36, p. 498, describes briefly what Decourt implies by the "dysgonic action" of antimalaria drugs, quinacrine in particular, and the method of treatment he employed with success.]

In a malarial locality in Brazil more than 7,000 malaria patients were treated in a variety of ways. Brief clinical notes and protocols of treatment of each of 54 patients, suffering from either *P. vivax* or *P. falciparum* malaria, are published; the cost of treatment is recorded in each case. The clinical attack was brought under control in different ways. Thereafter each of these 54 patients received atebrin 0·30 gm. and plasmoquine 0·02 gm. once a week in some cases, twice a month in others. Most of the subjects had received this suppressive treatment and been under observation for about six months. The number of "chemicoprophylactic doses" varied from 32 to 4, average 15. The results were as follows: 37 patients were free from parasites in their blood throughout; in 15 patients parasites were found on one or more occasions, but they showed no clinical signs of malaria and were able to carry on their work without interruption; only two of the 54 patients suffered from a clinical relapse.

The author claims that this treatment prevents relapses, is therefore economical, is free from danger, and by suppressing fever without destroying parasites allows the development of a state of premunition.

Norman White.

MARKOVICH (N. Ya.). Essais de lutte contre l'insecte ailé de l'*Anopheles maculipennis* au nord. [**Control of** *A. maculipennis* **in N. Russia.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1940. Vol. 9. No. 6. pp. 604–608. With 3 graphs. [In Russian.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1943. Mar. Vol. 31. Pt. 3. p. 55.]

In the summer of 1939, experiments on the control of adults of *Anopheles maculipennis*, Mg., in buildings were carried out in a group of villages on a river in the Province of Archangel. The usual type of dwelling there consists of a high log house joined by a passage to a large cow-house over which is a hay loft some 16 ft. high, and adjoining separate closed or open sheds, some 23 ft. high. In summer, the inhabitants usually sleep in the passage and the loft. The mosquitos began to leave their hibernation quarters on 18th–19th May and to oviposit on 25th–28th May, and first-generation adults first emerged on 22nd June; females with a developed fat-body were abundant in early August. The mosquitos concentrated in the cow-houses, and hardly any were observed in the living rooms or passages. Owing to the height of the sheds and lofts, the numbers of mosquitos in them could not be estimated, but those caught constituted 2–16½ and 2–73 per cent., respectively, of the total catch. The mosquitos were collected by hand in the living rooms and passages, but the cow-houses were sprayed with a 3 per cent. solution of soft soap, with the addition in some cases of raw alcohol (2 per cent.), which considerably increased the effectiveness of the spray. In all, 18 applications were made between 7th June and 25th August at intervals of 5 or 6 days. The lofts and sheds were not treated. Examination of the cow-houses 2–3 hours after spraying showed that in most cases some of the mosquitos survived, and the proportion that did so increased as the cow-houses were larger and darker and had more recesses and corners.

A comparison with neighbouring untreated villages, however, indicated that even partial treatment of infested buildings results in a reduction in the numbers of mosquitos and this was particularly evident during the period preceding the emergence of the first generation. Examination of the ampullae of the oviducts of active females showed that the numbers of older individuals taken were twice as great in untreated as in treated villages.

SHLENOVA (M. F.). Quelques déductions pratiques de l'expérience de lutte contre les moustiques dans les exploitations de tourbe d'Ozérétzkoïe. [**Control of** *A. maculipennis* **in Peat-Bogs in the Moscow Province.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1940. Vol. 9. No. 6. pp. 609–614. With 3 figs. [In Russian.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1943. Mar. Vol. 31. Pt. 3. pp. 55–56.]

In the course of an anti-malaria campaign in a peat-bog district in the Province of Moscow, it was found that if dusting against the larvae of *Anopheles maculipennis*, Mg., is stopped too early in the autumn, there is a considerable increase in the numbers of the overwintering adults, which renders work in spring more difficult. Thus, in 1934 the larvicide was last applied on 15th September, after which the adults did not appear in any considerable numbers, but in 1935, the last application was on 13th August and many mosquitos emerged in autumn ; three times as many adults emerged from hibernation in the spring of 1936 as in that of 1935. The systematic destruction in spring of females in cow-houses, which are their chief day-time shelters, considerably reduces the number that complete digestion and thus the number of eggs laid. The examination of breeding places near a village in which the adults were systematically destroyed and near a control village showed that the numbers of larvae caught per dip within a radius of 1,100 yards averaged 1½ and 12½, respectively ; no larvae were taken outside that radius round the treated village, whereas they were taken at distances of up to 2½ miles round the untreated one. In both cases the larvae became scarcer as the distance from the village increased.

Previous observations had shown that in this district men were seldom attacked in the open, but mosquitos were very active at night out of doors in the summer of 1936, when owing to unusually hot weather, most of the workmen slept in the open. Whereas in 1934–35, only 5–6 per cent. of the mosquitos caught in traps when entering the huts contained blood, in 1936, the percentage was 12·2 in mid-June, 51·7 during the last ten days of July and 19·5 in mid-August, this curve coinciding with the rise in temperature. Examination showed that the mosquitos caught entering buildings in the evening and the first half of the night chiefly consisted of unfed individuals, whereas those containing blood entered in the early morning before sunrise. This indicated that the mosquitos used the huts and cow-houses on hot days only as shelters in which to digest their blood meal. Of the engorged females trapped in 1936 when entering the huts, 59 per cent. contained human blood in June, 92·2 in July and 61·5 in August, and the corresponding percentages for those trapped in cow-houses were 6·8, 15 and 14·2. It appears, therefore, that there was no increase in the incidence of attack on cattle, and that the increased attack on man was due to a change in the habits of the population.

It is concluded that *A. maculipennis* is primarily attracted to men at night, wherever they may be, and less by the conditions of temperature and humidity out of doors.

The effect of meteorological conditions on the distribution of mosquitos in day-time shelters was observed in cow-houses in April; all the mosquitos occurred on the inner side of the roof of the hay-lofts, where the temperature was 13°C. [55·4°F.] and the relative humidity 67 per cent. In July, when the temperature and humidity in the lofts rose to 30·3°C. [86·48°F.] and 48 per cent., respectively, they were observed in the lower part of the cow-houses where the temperature and humidity were 22·7°C. [72·86°F.] and 59 per cent., and concentrated on the walls in dark corners.

PRENDEL (A. R.). Essais de contrôle de certaines méthodes de désinsection des abris diurnes des moustiques. [**Disinsectization of Day-Time Shelters of Mosquitoes.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1940. Vol. 9. No. 6. pp. 637–638. [In Russian.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1943. Mar. Vol. 31. Pt. 3. pp. 56–57.]

Insecticides that could be applied against mosquitos in their day-time shelters were tested in Odessa in large muslin cages containing 50–100 examples of *Anopheles maculipennis*, Mg., *Aëdes caspius*, Pall., and *Culex pipiens*, L. Mosquitos that fell to the ground were counted as dead since experience has shown that such individuals never survive. The easiest to prepare and apply, and the cheapest, were emulsions containing ½ per cent. soft soap and 1 per cent. formalin, or ½ per cent. hard soap and 2 per cent. crude alcohol, which gave complete mortality of the mosquitos and are recommended for treatment of cow-houses, etc., but produce too much humidity for use in dwelling houses. Higher concentrations (¾–3 per cent. soap) were less effective, as it was impossible to obtain a sufficiently fine dispersion. Other insecticides that gave 100 per cent. mortality included pyrethrum dust alone or mixed with an equal amount of wood ash, which is recommended for living rooms, a cheaper dust, prepared from pyrethrum residue, which required a higher rate of application, a dust of 15 per cent. anabasine sulphate, a spray prepared by steeping pyrethrum residue for 10 days in benzine, and one containing ½ per cent. soap and 0·1 per cent. anabasine sulphate.

AFANASSIEV (S. F.). **Contribution to the Question of the Use of the Distillate from Coke Stills against Mosquito Larvae.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1941. Vol. 10. No. 2. pp. 287–290. [In Russian.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1943. Mar. Vol. 31. Pt. 3. pp. 59–60.]

Investigations on the use against Anopheline larvae of a distillate from coke stills were continued in the northern Caucasus in 1939, when over 16,000 sq. yards of water was treated. It formed an elastic film that withstood slight rain and wind with a velocity of about 5 miles per hour, and killed most of the larvae and pupae in an hour. If the film was not broken by strong wind or rain, the water remained free from eggs or larvae for up to 9 days. A table shows the rates of application required at different temperatures and in the presence of different amounts of aquatic vegetation. Applied in an aquarium with dense submerged vegetation at a dosage ten times as high as that

normally used for treating infested waters, the distillate was not harmful to *Gambusia*. When in glass jars, the fish succumbed in 2 days in the presence of an unbroken film of the distillate on the water. Slowly flowing water in a ditch 40 ins. wide was effectively treated by allowing the distillate to drip from a muslin wick, and filling the entire width of the ditch a little lower down with leafy branches to make the liquid spread. It was applied at the rate of 180 drops a minute, the whole of the surface of the water was covered with a thin film in 15 minutes, and the film was maintained for 4½ hours.

The specific gravity of the distillate used does not exceed 0·925 at 15°C. [59°F.], its flash-point is not above 35°C. [95°F.], it begins to boil at a temperature of not more than 138°C. [280·4°F.], and its viscosity at 50° Engler does not exceed 1·60. Samples characterised by somewhat lower indices than these maxima were the best larvicides. [See this *Bulletin*, 1939, Vol. 36, p. 788.]

SHANNON (R. C.). **Brief History of *Anopheles gambiae* in Brazil.**—*Caribbean Med. Jl.* 1942. Vol. 4. No. 4. pp. 123–128.

This short account of the invasion of Brazil by *A. gambiae* is full of interest. Shannon discovered the larvae in 1930, and within a short time an intense epidemic of malaria struck the suburban section of Natal. The parasite rate of the *A. gambiae* reached the fantastic figure of 63 per cent., with a sporozoite rate of 30 per cent. The mosquito extended its breeding grounds during the succeeding rainy seasons, and by 1938 had reached the populous regions of the Assu, Mossoro and Jaguaribe valleys: 14,000 deaths from malaria were reported during 1938 and 1939. In 1939 a campaign of eradication was commenced; the last specimen was found 19 months later, in September 1940, and it now seems that the difficult feat of complete extermination has been achieved.

Success depended on five factors:—(1) The unfavourable topography and climate of the invaded region, so that in the dry seasons the breeding places were greatly reduced. (2) The presence of an organization capable of coping with the problem, namely the Yellow Fever Control Service of Brazil. (3) The peculiarities of the biology of the mosquito—the eggs do not withstand desiccation; they are deposited to a large extent in man-made, open, small pools relatively easy of detection; the adults are strongly domestic in habit. (4) The possession of two powerful weapons in Paris green and insecticidal sprays. (5) The failure of *A. gambiae* to escape from N.E. Brazil to the wetter regions: all transport conveyances leaving the infected zone were examined and sprayed. [This is a succinct account of a great achievement.] *C. W.*

BLACKWATER FEVER.

CREAGH (E. P. N.). **Notes on Four Cases of Blackwater Fever occurring in Southern Nigeria.**—*Jl. Roy. Army Med. Corps.* 1943. Feb. Vol. 80. No. 2. pp. 64–72. With 3 charts.

The first patient had lived in Africa for 17 years and had had blackwater fever in 1936. His last obvious attack of malaria was in December 1940, but in November 1941 he was admitted to hospital stating that he had passed "black" urine a few hours previously.

Haemolysis was massive and despite treatment with fluids, alkalis and blood transfusion he became anuric and died on the sixth day, with uraemic manifestations.

The second patient had spent about 6 years in Africa and had had various attacks of malaria; he took daily quinine regularly. He had felt unwell for ten days before admission to hospital in March 1942; no parasites were found in his blood but he was given 10 grams of quinine thrice during the day and on the following day developed blackwater fever. The haemolysis was considerable but the urinary output remained good. Treatment was along the usual lines and included small, slow blood transfusions; he was also given liver extract. The blood count continued to fall for some days after the urine had cleared and during convalescence he had several carbuncles. Malaria parasites were found on the 33rd day but they rapidly disappeared under the action of quinacrine [mepacrine, atebrin] without further blackwater fever occurring.

The third patient had also been many years in Africa where he had had much malaria and one attack of blackwater fever ten years ago. Before the present attack he had felt unwell for a week but no parasites had been found. He was slightly icteric and was thought to be suffering from infective hepatitis but, in view of his history, he was given quinacrine 0·1 gm. t.i.d. and quinine grains x. b.i.d. On the evening of the second day of treatment the quinine was discontinued and in the afternoon of the fourth day he passed urine containing haemoglobin. The urine cleared after twenty-four hours and there was no evidence of renal inadequacy. Malaria parasites appeared during convalescence on the 27th day and the patient was treated with quinacrine, no further blackwater occurring.

The fourth patient had been in Africa 19 months and had had fever once; he took quinine grains v daily. He had felt ill for five days and then observed that his urine was "black." The attack was relatively mild and the urine cleared in 24 hours, although there were two short relapses before it remained clear. *F. Murgatroyd.*

SMITH (Felix) & EVANS (R. Winston). **Effect of the *p*H of the Blood on Haemolysis with Special Reference to Blackwater Fever.**—*Brit. Med. Jl.* 1943. Mar. 6. pp. 279–282.

The authors found that, owing to changes in the *p*H of the blood, the fragility of the red cells in both normal and malarial subjects varies considerably during the 24 hours. They claim that at the onset of blackwater fever there is an increased fragility due in part to a lowering of the *p*H of the blood, and that the haemolysis can be arrested by giving large doses of alkalis, *e.g.*, sod. bicarb. and sod. citras ℥ii. grs. xx by mouth two hourly or 20 cc. of a 2M or 3M solution of sod. lactate intravenously thrice daily. They remark on the dangers of oedema from excessive fluids given intravenously and they recommend judicious blood transfusions after the early stages of the disease, as the most reasonable procedure for sustaining the efficiency of the kidney. *F. Murgatroyd.*

LOUTIT (John F.). **Blood *p*H and Haemolysis.** [Correspondence.]—*Brit. Med. Jl.* 1943. Mar. 20. pp. 360–361.

Loutit criticizes the views of SMITH and EVANS [above] on the ground that the effect of increase of *p*H in increasing red cell resistance to

haemolysis *in vitro* should not be taken dogmatically as indicating the same action *in vivo*. Moreover, these authors advocate the cross matching of blood in the ice box, but Loutit points out that 75–98 per cent. of normal bloods contain auto-agglutinins active at this temperature. He argues that it would be more logical to advise cross matching at 37°C. He quotes good results in two cases of blackwater fever from repeated blood transfusions with concentrated red cell suspensions, without reactions. *C. W.*

TRYPANOSOMIASIS.

FERREIRA (Cláudio). Alguns aspectos da tripanosomiase humana no noroeste da Colónia de Moçambique. [**Sleeping Sickness in North-west Mozambique.**]—*Bol. Geral de Med.* Bastorá. 1942. July–Sept. Ser. 24. Nos. 7–9. pp. 100–109. With 1 map.

After general remarks on human trypanosomiasis, the clinical symptoms, course of the disease and the vectors of the protozoon, the author gives brief notes of nine cases observed by him. All were treated with Bayer 205 followed by tryparsamide, except one old woman of 80 who died after receiving 1 gm. of the first drug. Two others left hospital early and could not be followed up, the remainder went out improved. The article contains a useful outline map showing the areas of distribution of Glossina in North-west Mozambique. They are widespread over an area bounded by Lake Nyasa on the west, the Rovuma river on the north and the Lucholingo river on the south-east ; also over a smaller area, triangular in shape, to the south, including Catur and Madimba, and between these two a narrow strip along the shore of Lake Nyasa. *H. Harold Scott.*

JACK (R. W.). **The Life Economy of a Tsetse Fly.**—*Proc. Rhod. Sci. Assoc.* 1942. Vol. 39. pp. 43–60. [Summary taken from *Rev. Applied Entom.* Ser. B. 1943. Feb. Vol. 31. Pt. 2. p. 40.]

This paper was written to bring together the results of the research work of various investigators on the bionomics of the tsetse fly in such a way as to present a picture of its life-history as a whole, exemplified mainly by *Glossina morsitans*, Westw., which has been the particular subject of study in Southern Rhodesia.

MURAZ (G.). Maladie du sommeil. Nécessité de compléter par la prophylaxie agronomique sa chimioprophylaxie et sa thérapeutique. [**The Need for Agronomic Measures in the Control of Sleeping Sickness.**]—*Presse Méd.* 1943. Jan. 30. Vol. 51. No. 4. pp. 41–42. With 2 figs.

This article, which follows three others by the author in *La Presse Médicale* (Nos. 28, 30 and 32 of May 30th, June 20th and July 4th, 1942, not received at the Bureau), records the effect of agricultural anti-tsetse measures, together with improved medical treatment, on the incidence of human trypanosomiasis in French West Africa.

Before 1939 the control of sleeping sickness had largely depended on periodic medical visits to village populations collected together for diagnosis and treatment. It often happened that an insufficient

number were present ; in one area the doctor saw only about 50 to 60 per cent. of the inhabitants, and at one place only 7 of 500 infected persons were regularly treated. This was corrected later by better administrative help. This failure to obtain direct control of human infection was an additional reason for incorporating agronomic preventive measures in the campaign against sleeping sickness.

The main points of the programme were given in the three articles referred to above. Special sums of money were obtained in 1940, 1941 and 1942 for an annual programme of agronomic prophylaxis. All the doctors in charge of special sectors were asked to observe the effect of infection on the incidence of new cases, and the author gives the results obtained in six sectors of different colonies of French West Africa as examples to demonstrate the success of the campaign.

The numbers of new cases of sleeping sickness in 1941 are compared with the corresponding numbers in 1940 ; there was a great reduction in all the sectors. The effect of the agricultural measures (bush clearing followed by cultivation) was especially discernible in North Togoland as medical inspection there, thanks to administrative assistance, was exceptionally complete. In one place, Borgou, in this area there were 94 new cases (20·43 per cent.) in May 1940 and only 11 (3·09 per cent.) in May 1941. In Sector 41 (Macenta, Guinea) the figures were compared with those of several villages where chemoprophylaxis and chemotherapy only, without agronomic measures, were employed. In the latter areas the numbers of new cases had either increased or only slightly decreased. *J. F. Corson.*

MAZZA (Salvador). Consideraciones sobre la enfermedad de Chagas en Bolivia. [**Chagas's Disease in Bolivia.**]—Reprinted from *Prensa Méd. Argentina.* 1942. Dec. 23. Vol. 29. No. 51. 15 pp.

In view of a report by Viana MARTINS and E. MACEDO in *Brasil Médico* of August 15, 1942 of their finding infected Triatomidae in Bolivia, the author has examined systematically Triatomidae from various parts of the country and here records his findings. The chief of these were that the following species were found infected with *T. cruzi* ; *Eutriatoma sordida*, numerous in dwellings in north and south Yungas in La Paz Department ; *E. oswaldoi*, one specimen from Suere, Chuquisaca ; *T. infestans* in Potosi Department (some 10 localities including Sococha, where Martins and Macedo found theirs), Tarija, Chuquisaca, the town of Cochabamba, and La Paz (seven localities).

Two other species, *Psammolestes coreodes* found in birds' nests in Chuquisaca Department, Azeri Province, and *Spiniger domesticus*, a non-blood-sucking Reduviid, were not found infected by *S. cruzi*, though flagellates of some kind, not identified, at least not stated, were being passed in the faeces of the latter. *H. Harold Scott.*

WOOD (Sherwin F.). **The Persistence of *Trypanosoma cruzi* in Dead Cone-Nosed Bugs (Hemiptera, Reduviidae).**—*Amer. Jl. Trop. Med.* 1942. Nov. Vol. 22. No. 6. pp. 613–621. With 12 figs. on 1 plate.

The author found several specimens of Triatomidae to be harbouring *T. cruzi* some time after death of the bugs and he notes 97 instances of detection of crithidia or trypanosomes in apparently dead bugs.

He next carried out experiments to determine how long after death the flagellates could be found living. Some were examined each day till 15 days after death. Of 270 bugs which had fed on mice experimentally infected, 249 were positive in the faeces during this period and 21 were negative. *Triatoma protracta*, *T. rubida* and *T. longipes* were used, nymphs and adults. On the 15th day two out of four were still positive. Crithidia were found more often than were trypanosomes.

The body cavities and body fluids of dead insects were also found to contain live forms of *T. cruzi* in some stage; the rodents which harbour *T. cruzi* are all entomophagous and probably can become infected in this way; this habit would account for the maintenance of infection in the burrows under natural conditions.

H. Harold Scott.

LENT (Herman). Transmissores da molestia de Chagas no estado do Rio de Janeiro. [**Transmission of Chagas's Disease in the State of Rio de Janeiro.**]—Reprinted from *Rev. Fluminense de Med.* Rio de Janeiro. 1942. June. Vol. 7. No. 6. 13 pp. With 1 folding map. [23 refs.]

PACKCHANIAN (A.). **Reservoir Hosts of Chagas' Disease in the State of Texas. Natural Infection of Nine-Banded Armadillo** (*Dasypus novemcinctus texanus*), **House Mice** (*Mus musculus*), **Opossum** (*Didelphis virginiana*), **and Wood Rats** (*Neotoma micropus micropus*), **with** *Trypanosoma cruzi* **in the State of Texas.**—*Amer. Jl. Trop. Med.* 1942. Nov. Vol. 22. No. 6. pp. 623–631. With 4 figs. [15 refs.]

It is well known that armadillos are reservoir hosts of *T. cruzi* in Brazil and South American centres of Chagas's disease; Chagas has also reported the cat, dog and certain monkeys (*Chrysothrix sciureus*) as naturally infected, and in California a wood-rat, *Neotoma fuscipes macrotis*, has been reported as a reservoir host.

The present author has proved that *Triatoma gerstäkeri* and *T. heidemanni* are naturally infected in the State of Texas [this *Bulletin*, 1940, Vol. 37, p. 142; 1941, Vol. 38, p. 81] and he set out to determine the reservoir hosts in the same areas. With this end in view he collected several mammals in the State and examined their blood directly and also by animal inoculation, by culture and by xenodiagnostic methods. He found the following to be infected in nature: *Dasypus novemcinctus* (nine-banded armadillo), *Didelphys virginiana* (opossum), *Mus musculus* (house mouse) and *Neotoma micropus micropus* (wood rat). Often culture gave positive results although no trypanosomes could be found by direct examination of the blood.

H. Harold Scott.

LEISHMANIASIS.

PARROT (L.), DONATIEN (A.) & PLANTUREUX (Edm.). Sur l'infection naturelle des phlébotomes par la leishmaniose générale de l'homme et du chien en Algérie. [**Algerian Phlebotomus naturally infected with Generalized Leishmaniasis of Man and Dog.**]—*Arch. Inst. Pasteur d'Algérie.* 1941. June. Vol. 19. No. 2. pp. 209–218. With 1 chart. [15 refs.]

During the summer of 1940 daily catches of sandflies were made in certain kennels in a suburb of Algiers where dogs known to be suffering from generalized leishmaniasis were housed. In all, in the five months June to October, 1,142 females were captured. The majority of these belonged to the two species *Phlebotomus perniciosus* and *P. longicuspis*, there being only 32 *P. sergenti*, 12 *P. ariasi* and 8 *P. parroti*. Of the captured females 508 were dissected. These comprised 250 *P. perniciosus*, 248 *P. longicuspis*, 7 *P. sergenti* and 3 *P. ariasi*. None of the last two species was found infected, but 50 *P. perniciosus* and 40 *P. longicuspis* harboured flagellates of the leptomonas type. In both species the most infections were found in the month of June and it was in this month also that the largest number of sandflies was caught. In most flies the infection was confined to the stomach only or to the stomach and cardia. In a small number it extended to the oesophagus also, while in one *P. perniciosus* the proboscis was infected.

With a view to testing the possibility of the passage of infection from parent to offspring, 124 gorged females were allowed to lay their eggs. From these 105 *P. perniciosus*, 113 *P. longicuspis*, and 21 *P. sergenti* were reared. These were dissected within 24 hours of their emergence but in no case was there any indication of infection though from the dissection of sandflies captured at the same time as those which laid the eggs an infection rate of 12 per cent. was to be expected. It would thus appear that infection does not pass hereditarily from parent to offspring. Furthermore, as the females which laid the eggs and died soon after were not removed from the rearing cages, the larvae would feed on the decomposing bodies of these females, of which presumably 12 per cent. were infected. If the larvae had thus acquired a leptomonas infection it was to be expected that the infection would pass to the pupae and the adults. The absence of infection in the adults would seem to indicate that such a method of infection does not occur. The general result of the observations recorded in this paper is that in N. Africa both *P. perniciosus* and *P. longicuspis* are to be regarded as vectors of kala azar.

C. M. Wenyon.

MÉCHIN (R.) & GUIGON (G.). Un nouveau cas de bouton d'Orient du Tell constantinois. Traitement par la quinacrine locale. [**Case of Oriental Sore in the Constantine Tell treated with Quinacrine.**]—*Arch. Inst. Pasteur d'Algérie.* 1941. June. Vol. 19. No. 2. pp. 219–220. With 1 plate.

The paper describes a case of oriental sore in a man 37 years of age. Though he lived in Constantine he paid frequent visits to El Melia and Grarem, where sporadic cases have previously been recorded. There was a lesion on the right side of the nose which caused a redness of the surrounding skin and oedema of the right eyelid. Treatment consisted

of infiltration of the lesion with a solution of quinacrine (atebrin) (0·1 gm. in 2 cc. of distilled water) on three occasions, with intervals of 8 and 15 days. The lesion cicatrized completely, so that it would appear that the drug, recommended for the treatment of this condition by FLARER [this *Bulletin*, 1939, Vol. 36, p. 454], has a definite curative action. The authors hesitate to conclude that complete cure has been obtained in this case, since the redness of the skin and the oedema of the eyelid have persisted. *C. M. Wenyon.*

VOGT (P.). Un cas sporadique de bouton d'Orient dans l'Ouest de la Mitidja (Alger). [**A Case of Oriental Sore in the West of La Mitidja.**]—*Arch. Inst. Pasteur d'Algérie.* 1941. June. Vol. 19. No. 2. p. 221. With 1 plate.

This is the record of a case of oriental sore in a child from the village of Marengo in a district of Algeria where repeated observations during the past 20 years have failed to disclose any other case.

C. M. Wenyon.

FEVERS OF THE TYPHUS GROUP.

POMALES-LEBRÓN (A.) & MORALES-OTERO (P.). **The Proteus X Bacilli and the Weil-Felix Reaction.**—*Proc. Soc. Experim. Biol. & Med.* 1942. Dec. Vol. 51. No. 3. pp. 361–363.

In an investigation of the reliability of the Weil-Felix reaction 72 cultures of *Proteus X* organisms were studied: they were obtained from 30 Public Health Laboratories in the U.S.A. All but five were found to be typical in their biological and agglutination reactions. Of the five atypical cultures, three were aberrant in their biological reactions but gave typical agglutination responses, another did not form indole and the fifth, which was supposed to be *Pr. X19*, did not agglutinate with high-titre typhus serum though it gave typical biological responses.

With high-titre typhus serum 21 of 23 *Pr. X2* cultures gave completely negative reactions, and only 3 of 14 *Pr. XK* cultures were slightly agglutinated.

The *XK* cultures differed in their biological reactions from *X19* and *X2* in not fermenting maltose and salicin, and in not producing indole. All the strains acted on gelatin in exactly the same way.

Agglutination reactions were carried out on about 1,000 persons belonging to three groups, (1) normal Americans, (2) normal Porto Ricans, and (3) Porto-Rican hospital patients. There were from 211 to 414 persons in each group. No cases of suspected typhus were included. For each dilution the figures shown in the table relate to the groups in which the lowest and highest percentages of positive reactions were found. The figures marked with an asterisk refer to the hospital-patient group: the other figures are about equally distributed among the other two groups and the author considers that there was no appreciable difference in the proportion of cases whose sera agglutinated the different antigens among the three groups of persons.

The notable features of the results are the large number of sera which agglutinated *Pr. OXK* in the lowest dilution, and *Pr. X2* even in

dilutions of 1–100. Still more remarkable is the large proportion of positive reactions to *Pr. X19* in all the groups. Alcohol-treated suspensions were used so that *Pr. X19* is obviously quite unsuitable for testing suspected cases.

With *Pr. OX19* supplied by the National Institute of Health (U.S.A.) a positive agglutination in 1–400 dilution is significant.

	1–25	1–50	1–100	1–200	1–400	Neg.
XK ...	76·2–81·8	18·2–26·8*	1·2–5·9*	0·5–2·2*	0–0·7*	18*–23·8
2 ...	50·2–63·9*	27·1–40·1*	8·3–20·8*	3·1–9·3*	0·8–2·4	35·8*–49·7
X19 ...	39–45	20–22·4	5·7–9·6	0·4–2·6*	0–1·1*	55·9–60·1
19 ...	79·8*–87·2	66·4*–73·2	42·5*–49·1	21·2*–28·4	8–14·2	13·7–20·2*

John W. D. Megaw.

SONNENSCHEIN (C.). Pseudo-Weil-Felix Reaktion bei Proteusinfektionen. [**The Pseudo-Weil-Felix Reaction in Proteus Infections.**]—*Deut. Med. Woch.* 1943. Jan. 8. Vol. 69. No. 1. pp. 11–12.

The author has already described a "pseudo-Weil-Felix reaction" in two patients suffering from septic infections, in which streptococci and *Proteus vulgaris* were isolated from the discharges. In one of these the titre was 1–1,600.

In a recent case of traumatic empyema from which the same organisms were isolated, there was a reaction to *Proteus OX19* at a titre of 1–200 and a negative reaction to *Pr. X2* and *X4*. The results were the same with serum inactivated by heat. The serum did not react to the patient's own strain of Proteus.

Wound secretions of 134 persons were investigated: from 38 of these strains of Proteus were isolated, all were H strains except two which were O. The sera of 18 agglutinated *Pr. X19* in dilutions of 1–100 to 1–640; only four reacted when the sera were inactivated, so there was no possibility of distinguishing between the true and the pseudo-reactions by this means. Rickettsial agglutination was tried in three cases, all of which gave definitely positive reactions in titres of 1–80 to 1–160 as compared with the Weil-Felix reactions of 1–160 to 1–320.

The author regarded Weil-Felix titres of less than 1–2,000 as inconclusive in persons with septic infections unless the symptoms pointed definitely to the diagnosis of typhus. Rickettsial agglutination does not help: it is positive in Proteus infections as well as in typhus.

John W. D. Megaw.

AHRENS (Walther). Die Trockenblutagglutination zur Fleckfieberdiagnose. [**The Dry-Blood Agglutination Test for Typhus Fever.**]—*Arch. f. Hyg. u. Bakt.* 1942. Vol. 128. No. 4/5. pp. 216–227. With 2 figs. [31 refs.]

The technique devised by KUDICKE and STEUER (1940) was adopted [this *Bulletin*, 1942, Vol. 39, p. 372]. Slides measuring 15 × 6 cm. were used: on these it was possible to apply 18 droplets of blood and to test the agglutination of three dilutions of each of six different organisms,

viz. two strains of *Proteus OX19* and one each of typhoid, paratyphoid B, Shiga-Kruse, and Flexner bacilli. The dilutions were about 1–17, 1–33, and 1–50. A chart was used to show the position of suspension on the slide, but it must have been something of a feat to prepare and observe 18 suspensions at a time.

The readings were made after 1, 15 and 30 minutes. The total number of blood samples tested was 1,409, of which 1,074 were from known or suspected cases of typhus. The following results were those obtained with the Berlin strain of *Pr. OX19* ; those observed with the Leipzig strain were significantly different.

Of 807 samples which had given negative Weil-Felix reactions only 21 gave weakly positive reactions to the test after 30 minutes, and only 7 after 15 minutes of observation. Of 64 samples with a Weil-Felix titre of 1–50, 37 were positive to the test, most of them weakly. Of 39 samples with a Weil-Felix titre of 1–100, only 4 were negative to the test, and all the 179 samples with titres of 1–200 and over were positive.

The presence of heterologous agglutinins was shown by the test just as with the Weil-Felix reaction ; of 79 samples strongly positive to the Weil-Felix and the dry-blood test, 44 gave weakly positive reactions to the Flexner group by the latter test, and 5 of these gave moderate positive reactions to typhoid and to paratyphoid B. One sample was weakly positive to paratyphoid B alone. These heterologous agglutinins must to some extent be associated with the immunizing mechanism of typhus because they were found in 58 per cent. of the cases with strongly positive Weil-Felix reactions and only in 24 per cent. of those with negative reactions.

Some useful hints are given about the technique.

[This kind of test is likely to be very useful in making rapid surveys of communities and in bedside diagnosis. A single dilution would probably suffice in most cases ; in fact in the present series the low-titre dilution almost always gave as much information as the three suspensions if the intensity and time of appearance of the reaction were taken into account. A set of six dry smears could easily be made on a glass slide and tested with suspensions of six suitable organisms. The smears could be separated from each other with strokes of a wax pencil, as suggested by Steuer. The abbreviated name of the test in German is the " T B A test " ; perhaps in English the name " dryblag " test would be more suggestive of the nature of the reaction.]

John W. D. Megaw.

CLAVERO (G.) & PÉREZ GALLARDO (F.). La prueba intradérmica de Giroud en la infección tifoexantemática. Nuestra experiencia personal. Técnicas y posibilidades de su aplicación. [**The Giroud Intradermal Test in Typhus Fever.**]—65 pp. With 9 figs. (1 coloured). [30 refs.] Publicaciones de la Revista de Sanidad e Higiene Publica. Madrid. 1942. Dec.

After trials of various antigenic substances, cultures of Rickettsiae grown by Cox's method were found most suitable. Suspensions made from the vitelline membranes before the death of the embryo chicks were much more effective than those made from other embryonic tissues. Four strains of *Rickettsia prowazeki* isolated in Madrid were tested, one caused a weak dermal reaction, the other three caused typical skin lesions in white rabbits between the third and fifth days. There was a central necrotic spot surrounded by a zone of nodulation and an outer zone of hyperaemia.

For the test, 0·25 cc. of undiluted serum was mixed with an equal quantity of diluted suspension of richly infected vitelline membrane: the mixture was kept for not less than 20 minutes and not more than 90, and was then injected intradermally into white rabbits whose backs had been shaved with an electric safety razor. Three dilutions were made in each case, 1–10, 1–100 and 1–1,000. Three similar dilutions of the suspensions unmixed with serum were injected as controls.

With four specimens of serum from cases of other diseases no evidence of protection was found, but the sera of 40 patients in various stages of convalescence from typhus gave positive reactions, though in two of these the protective action of the serum was decidedly weak. It was also weak in one patient in the eleventh month of convalescence and completely absent in another in the tenth month.

The reaction promises to be useful in disclosing "inapparent" attacks and in estimating the protective value of vaccines and sera. Full details of the experiments are given. *John W. D. Megaw.*

LEWICKI (Edwin). Ein Beitrag zur Klinik und Diagnose des Fleckfiebers. [**Clinical and Diagnostic Observations on Typhus Fever.**]—*Wien. Klin. Woch.* 1942. Dec. 25. Vol. 55. No. 52. pp. 1024–1027. With 1 fig.

The author claims that typhus fever on the Russian front has been restricted to small outbreaks by prompt and energetic measures of control. In spite of great variations in the severity and clinical features of the disease an early diagnosis can usually be made on purely clinical grounds.

The fever has a rapid onset: the high continued fever stage is reached in two or three days after a step-like rise which is more rapid than in typhoid. The plateau of the curve lasts about 11 days during the last two or three of which there are often remissions of one or two degrees (Centigrade). By about the 14th day the fall by lysis begins, this lasts about three days.

The chief features of the onset are: the swollen, drunken-like facies; enlargement of the spleen, at least by percussion; disturbance of speech; and the obvious illness of the patient. Quite early the tongue is dry and has a thick brown coating. A significant rise in the Weil-Felix titre comes too late for early diagnosis, even when there are facilities in the field for carrying out the test.

The rash appears on the fourth, or more often on the fifth day; the spots vary greatly in size and colour, they often fade after 12 hours or so. They are first seen on the chest, then on the back and upper arms. They may be difficult to detect in soldiers suffering from scabies or abrasions due to scratching. Petechiae are often absent.

The cerebral symptoms are in proportion to the circulatory disturbances. The "pseudo-crisis" was never seen, though sometimes there was a fall in the temperature during the continued-fever stage accompanied by circulatory failure and followed by a fresh rise with restoration of the circulation.

The treatment was on the same lines as in other severe fevers. Caffeine and strychnine were given thrice daily by subcutaneous injection, and a quarter of a milligramme of strophanthin was given once daily; these doses were given twice as often in severe cases. Eubasin [sulphapyridine] was also given to prevent pneumonia. Convalescent serum and transfusions of the blood of inoculated persons were useless.

Plenty of fluid was given by the mouth. Apart from unforeseen complications a good idea could be formed of the prognosis from the condition of the patient in the early stages of the illness. Stress is laid on the slowness of the convalescence; nervous symptoms often persisted for two or three weeks after the end of the fever, and circulatory weakness might last for weeks, or even months.

The author emphasizes the importance of early diagnosis by clinical observation, and the failure of laboratory methods to give help at the time when this is most needed. *John W. D. Megaw.*

Loos (W.). Die Kältekonservierung des Fleckfiebervirus. [**Preserving Typhus Virus by Cold.**]—*Deut. Trop. Ztschr.* 1942. Nov. 15. Vol. 46. No. 22. pp. 564–566.

Several workers have shown that murine and other strains of Rickettsiae can be kept alive in animal tissues for periods up to 169 days at temperatures of 10° to 20°C. Scarcity of animals forced the author to adopt this method in maintaining four strains of *R. prowazeki*. At a temperature of 18°C. one strain survived up to 196 days, while another lost its virulence after periods of 42, 50, 64 and 194 days, although on one occasion it survived for 37 days and on another for 61 days. All four strains were maintained without any failure for four or five successive periods of about 30 days; these periods were alternated with intraperitoneal inoculations of guineapigs.

The brains of the animals were removed aseptically and were kept in sterile glass tubes without the addition of any preservative.

John W. D. Megaw.

Varela (Gerardo) & Parada Gay (Miguel Angel). Inyecciones intraperitoneales de sangre para obtener pululación de *Rickettsia prowazeki*. (Estudio de 3,018 ratas.) [**Enriching the Growth of *R. prowazeki* by Intraperitoneal Injections of Blood.**]—*Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1942. Dec. Vol. 3. No. 4. pp. 293–295.

Since 1932 the authors have enriched the growth of orchitic strains of Rickettsiae in the peritoneum of the rat by intraperitoneal injections of fresh heart blood of guineapigs. The average amounts of blood were: 10 cc., 24 hours after inoculation; 5 cc., 72 hours after inoculation; and 3 cc., 95 hours after inoculation; the doses were modified according to the rate of absorption and the general condition of the rats. The rate of absorption could be estimated more easily in animals whose abdomens were shaved. The rats were killed on the 5th day after inoculation.

Altogether, 3,018 rats were inoculated with vaginal washings from 627 infected guineapigs. Rickettsiae were difficult to detect in the washings of 157 guineapigs; they were few in 162; moderately numerous in 152; abundant in 119; and very abundant in 37.

Deaths among the inoculated rats were:—1st day, 24; 2nd day, 57; 3rd day, 158; 4th day, 297; and 5th day, 737. The rest were killed.

The number of rats used for the detection of Rickettsiae in the peritoneum was 1,897: the findings were: very scanty, 334; few, 235; moderately numerous, 368; abundant, 385; and very abundant, 575. There were 128 cases of contamination with bacteria. The method is claimed to have the advantages of simplicity and economy of material.

[The strain is called *R. prowazeki* in the title, but from the text it is clear that an orchitic (*R. mooseri*) strain was employed.]

John W. D. Megaw.

PATIÑO-CAMARGO (Luis). Tifo murino en Bogotá. Nota preliminar. [**Murine Typhus in Bogotá (Preliminary Note).**]—*Bol. Oficina Sanitaria Panamericana.* 1942. Nov. Vol. 21. No. 11. pp. 1090–1099. With 6 figs. on 2 plates. English summary.

Eight strains of "virus of the exanthematic-typhus-rickettsia type" have been isolated in Colombia. These fall into three groups (1) "Tobia spotted fever" [tick-borne]; (2) "epidemic typhus" [louse-borne] of which an outbreak in Bogotá has already been described by the author [this *Bulletin*, 1942, Vol. 39, p. 542] and (3) "murine typhus" [flea-borne] dealt with in the present note.

Investigations were made in three separate places in Bogotá, in each of which orchitic strains of Rickettsiae were isolated from the blood of a patient and in rat fleas caught in the immediate surroundings: in two of the places Rickettsiae were also isolated from rats caught in the vicinity.

In two of the localities single cases occurred: both were typical severe cases of typhus. In the third locality seven cases occurred in a rat-infested hostel between the end of April and the end of June 1942. The intervals in days between the onsets of the successive cases were, 7, 25, 8, 1, 8 and 2. The fever lasted from 8 to 10 days in 3; from 14 to 15 days in 3, and 18 days in the remaining case. A rash was seen in four of the patients. There were no deaths.

The rats were *Rattus norvegicus* and *Rattus rattus*. The fleas were identified in only one locality: they were *Ceratophyllus* (*Nosopsyllus*) *fasciatus* and *Leptopsylla segnis*.

John W. D. Megaw.

DAVIS (G. E.). **The Rocky Mountain Spotted Fever Rickettsia in the Tick Genus** *Ornithodoros.*—*Proc. 6th Pacif. Sci. Congr. 1939.* Vol. 5. pp. 577–579. [Summary taken from *Rev. Applied Entom.* Ser. B. 1943. Mar. Vol. 31. Pt. 3. pp. 41–42.]

An account is given of experiments in which Rocky Mountain spotted fever was transmitted to healthy guineapigs by nymphs and adults of each sex of *Ornithodoros parkeri*, Cooley, that had fed in earlier nymphal instars on infected ones. Another guineapig was infected by injection of eggs laid by an infected female. Similar tests with *O. turicata*, Dugès, gave negative results, but this species could harbour the infection. The localities in which *O. parkeri* has been collected all lie within the region in which Rocky Mountain spotted fever is endemic and in which *Dermacentor andersoni*, Stiles, transmits it to man and *Haemaphysalis leporis-palustris*, Pack., among animals, and *O. parkeri* infests susceptible hosts of these ticks. These facts and its ability to transmit the infection experimentally suggest that it may help to maintain it in nature.

PHILIP (C. B.). **Rocky Mountain Spotted Fever: Known and Potential Tick Vectors in the United States.**—*Proc. 6th Pacif. Sci. Congr. 1939.* Vol. 5. pp. 581–584. [11 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1943. Mar. Vol. 31. Pt. 3. p. 42.]

In view of the fact that the area of the United States in which Rocky Mountain spotted fever is known to be endemic has recently

been vastly extended to include all the States except Kansas, Wisconsin, Michigan, Maine, New Hampshire, Vermont, Connecticut and Rhode Island, a summary is given of present knowledge on the known tick vectors (*Dermacentor andersoni*, Stiles, *D. variabilis*, Say, and *Haemaphysalis leporis-palustris*, Pack.) and the species that transmit the disease experimentally and are thought to be potential vectors in nature (*Amblyomma americanum*, L., *A. cayennense*, F., *D. occidentalis*, Marx, *Rhipicephalus sanguineus*, Latr., *D. parumapertus*, Neum., and *Ornithodoros parkeri*, Cooley).

YELLOW FEVER.

It has been pointed out that in the Summary of Recent Abstracts on Yellow Fever [this *Bulletin*, 1943, Vol. 40, p. 97] an incorrect reading of Findlay's view of the maintenance of rural yellow fever in West Africa has been given. Findlay (1941) stated that although *at present* the only two definite factors known to be concerned in spread are the infected mosquito and the infected human being, before it is possible to give an answer to the question whether animals (bats, squirrels and other small rodents) play any rôle in maintaining endemic yellow fever it will be necessary to examine some hundreds of specimens, instead of, as at present, just under fifty.

The comment on Findlay's paper, therefore, does not apply, and there is no antithesis between his views and those of the Rockefeller workers.

WHITMAN (Loring). **A Modified Intraperitoneal Protection Test for Yellow Fever based on the Greater Susceptibility of Immature White Mice to the Extraneural Injection of Yellow Fever Virus.**—*Amer. Jl. Trop. Med.* 1943. Jan. Vol. 23. No. 1. pp. 17–36. With 2 figs. [11 refs.]

This paper furnishes a valuable discussion of many of the variable factors involved in the development of a mouse protection test which will be satisfactory for all purposes in the investigation of yellow fever problems. In 1931 SAWYER and LLOYD [see this *Bulletin*, 1932, Vol. 29, p. 198] described an intraperitoneal protection test for yellow fever in adult white mice which has not only been of the utmost value in determining the geographical distribution of yellow fever, but has been equally important in the study of the disease both in the field and in the laboratory. This test is based on the fact that although adult white mice are relatively insusceptible to the extraneural injection of yellow fever virus, they become uniformly susceptible following cerebral trauma. There are three chief disadvantages to this test. In the first place, 3 cc. of serum are required for a single test. Although this is of little importance when dealing with man or larger animals, it hinders studies on small serum samples such as can be got from small animals or birds. Secondly, because of the large virus doses required per mouse, fresh unstandardized virus preparations must be used. Thirdly, the supplementary starch injection into the brain not only increases mortality through manipulation but also augments the labour and time consumed.

These disadvantages were partially overcome in the "intracerebral" protection test first described by THEILER and more recently refined by BUGHER [see this *Bulletin,* 1931, Vol. 28, p. 723; 1941, Vol. 38, p. 434]. This test relies on the injection of serum-virus mixtures directly into the brain. Not only are the virus requirements infinitesimal compared with the dosages needed for successful intraperitoneal tests, but the quantity of serum needed is likewise minimal. As it is necessary to have a test virus preparation that is stable and of known strength, well desiccated virus suspensions are required. The chief disadvantages of the "intracerebral" test are that some species of animals and birds possess substances in their sera which are highly toxic for mice on intracerebral inoculation, yet which do not affect mice when injected intraperitoneally. The same is true for sera which are contaminated with moderately pathogenic bacteria or fungi. Secondly, slight variations in the technique of intracerebral injections, such as the point of injection and depth, may result in significant discrepancies in the results. It appeared, therefore, that an intraperitoneal test, which could be performed with a single injection and would require but a small volume of serum per test would have value.

THEILER [this *Bulletin*, 1930, Vol. 27, p. 872] and BUGHER [*ibid.*, 1941, Vol. 38, p. 437] have previously pointed out that baby mice were much more susceptible to the extraneural injection of yellow fever virus than were adult mice. In fact, it appears that during the first days of life they are as susceptible to virus injected subcutaneously as are adults to virus introduced intracerebrally. On the theory that the transition from full susceptibility to relative resistance was gradual, the author decided to study the intermediate ages of 14 to 35 days to see whether there could be demonstrated an age at which satisfactory intraperitoneal protection tests could be performed without the supplementary starch injection into the brain and utilizing smaller doses of both serum and virus than are necessary for the adult test.

Young mice of several ages were injected intraperitoneally with one-tenth the quantity of both serum and virus normally required in the standard intraperitoneal test. The results indicated that up to 21 days of age the young mice were quite susceptible to the dosage of virus used, but that beyond that age, the percentage of mice killed by the virus fell relatively rapidly. Furthermore, failure of immune serum to protect completely 7- and 15-day-old mice indicated that they were too sensitive to the selected virus dosage to be protected by the immune serum. While it was felt that by reducing the virus dosage a test could be devised for these younger mice, the fact that they were too young to be weaned from their mothers offset the value of their greater sensitivity. For this reason it was decided to limit further investigations to mice between 18 and 21 days of age.

It was found that although at any one age the smaller mice are more susceptible to virus than the larger, the difference is less than that observed between mice of different ages. Small 21-day mice are more resistant to virus than 18-day-old mice even though the latter outweigh them. No evidence was found to indicate that sex influences the level of immunity at any age.

When two parts of immune serum are added to one part of virus, the results of injecting 0·06 cc. of the mixture into 18- to 21-day mice are equivalent to injecting adult mice which have received intracerebral starch with 0·6 cc. By increasing the proportion of immune serum to virus and increasing the volume of the inoculum so that the amount

of virus received by each mouse remains the same, the protective capacity of the immune serum is augmented. The presence of small amounts of antibody can thus be easily demonstrated. It appears, therefore, that this test will be particularly useful in testing wild animal sera and the sera of post-vaccination groups, in both of which antibody levels may be extremely low.

The chief disadvantage of this test is the fact that only mice of uniform and exactly known age must be used. Only those laboratories breeding their own mice are in a position to meet this prerequisite. Another disadvantage of the test is the periodic fluctuation in susceptibility of young mice to standardized virus doses. These fluctuations require constant attention to dosage to keep the test on a more or less uniform basis.

The technique of the test is set out in great detail. The French strain of neurotropic virus was used throughout in the form of a 15 or 20 per cent. suspension by weight of infected mouse brains in either physiological saline or a 5 to 10 per cent. normal serum in saline diluent. For the sake of uniformity the virus used has been restricted to the 500th to 600th passage in mice. As control a titration of a known "standard" immune serum was included in each group of tests. In addition, the test virus was titrated intraperitoneally to give direct evidence of its strength. The mice are checked daily and the results noted on the same type of cards as were recommended by SAWYER and LLOYD. At the end of 10 days the results of the test are read in the same manner as in the standard test. *Hugh H. Smith.*

SOPER (Fred L.). Febre amarela Panamericana, 1938 a 1942. [**Yellow Fever in the Americas, 1938–1942.**]—*Bol. Oficina Sanitaria Panamericana.* 1942. Dec. Vol. 21. No. 12. pp. 1207–16, 1221–2. English summary pp. 1251–1252.

In this paper Soper reports to the Eleventh Panamerican Sanitary Conference as he had previously done to the ninth and tenth conferences [see this *Bulletin*, 1935, Vol. 32, p. 882; 1941, Vol. 38, p. 71] the situation as regards yellow fever in South America for the preceding four-year period. He was able to state that (1) epidemics transmitted by *Aëdes aegypti* and originating from other outbreaks of *aegypti*-transmitted yellow fever had not been observed in the Americas since 1934; (2) that only one outbreak of *aegypti*-transmitted yellow fever secondary to jungle yellow fever had been discovered during the period, *i.e.* in Sens Madureira, Território do Acre at the beginning of 1942; (3) that outbreaks of jungle yellow fever had been discovered in the States of Espirito Santo, Rio Grande do Sul, Santa Catarina, Baiá, Pará, Amazonas and the Território do Acre of Brazil in Bolívia; in Perú; in Colombia; and in Venezuela.

Epidemiological observations during this four-year period demonstrated that jungle yellow fever occurs in a great variety of conditions where there are wide differences in the type of bush, of mosquitoes, of animals and of climate. The author states that cases of human jungle yellow fever in South America are probably secondary to epizootics in the forest. He offers the hypothesis that in some forested regions there are sufficient populations of susceptible animals and mosquito vectors to make it possible for the infection to be permanently maintained on a basis of a mosquito-animal-mosquito cycle.

Great progress is reported in the anti-Stegomyia campaign. The present programme of the Yellow Fever Service of Brazil is the complete eradication of *Aëdes aegypti* from the country. Already the species has been eliminated from the States of Maranhao, Espirito Santo, Goiaz, Paraná, Santa Catarina, Minas Gerais and the Distrito Federal. Bolivia, Perú, Brazil and Colombia are collaborating on a programme to free the entire Amazon Valley of this mosquito.

Vaccination has proceeded during the period with the 17D strain of virus. In the main the results have been satisfactory and the duration of immunity appears to be very long. In 1938–39 the vaccine used during an epidemic in Espirito Santo failed to give satisfactory immunity to those vaccinated. It was found that the strain of virus used had apparently lost most of its antigenicity through prolonged passage in tissue culture. When earlier subcultures were resorted to the r sults were again good. Another complication encountered in Brazil was the occurrence of a considerable number of cases, some fatal, of delayed jaundice following vaccination. It was thought that this phenomenon was due to the human serum component of the vaccine. When the use of serum was discontinued in the preparation of the vaccine, no cases of jaundice were observed among the 347,000 individuals who have received the new vaccine since 1940. During 1941 a third difficulty was encountered. In an area in which 55,000 persons were vaccinated 199 of them showed signs of an involvement of the nervous system. It was thought that they suffered from an encephalitis due to a slight modification of the vaccine virus. Fortunately all of these cases recovered. Following the selection of another substrain of the vaccine virus, no cases of unusual reaction to vaccination have been observed.

The following recommendations for the future yellow fever programme of the continent are made :—

(1) The anti-larval campaigns should be organized on a permanent basis in the principal ports and cities where *Aëdes aegypti* abounds, for the purpose of eradication of the species from this continent.

(2) Viscerotomy should be organized in all jungle regions of countries where yellow fever has been endemic in order to ascertain where vaccinations should be applied. With the organization of antilarval work as recommended above there will be no need for urban viscerotomy.

(3) Large scale vaccination should be employed to protect populations exposed to jungle yellow fever and for the immunization of the crew and passengers of aircraft.

With a programme of *aegypti* eradication there should be no need for general urban vaccination. *Hugh H. Smith.*

ANDUZE (Pablo J.). Distribución geografica de los haemagogus Venezolanos y su posible relación con la fiebre amarilla selvatica. [**Geographical Distribution of Venezuelan Species of Haemagogus, and their Possible Relation to Jungle Yellow Fever.**]—*Rev. Sanidad y Asistencia Social.* Caracas. 1942. Dec. Vol. 7. No. 6. pp. 821–824. With 2 maps.

Following reports from Brazil that Haemagogus mosquitoes can transmit by bite the virus of yellow fever [see this *Bulletin*, 1939, Vol. 36, pp. 27–28], the author decided to accumulate the known data on the distribution of these mosquitoes in Venezuela.

Of the four species of Haemagogus known in Venezuela *Haemagogus celestis* is the most widely distributed. *Haemagogus capricorni*, *Haemagogus equinus* and another species, probably *Haemagogus albomaculatus*, have been discovered also in a number of wooded areas in various parts of Venezuela.

[Since the distribution of jungle yellow fever has not been fully studied in Venezuela, it is not possible at present to correlate the occurrence of the disease with the presence of Haemagogus mosquitoes.]

Hugh H. Smith.

PLAGUE.

PALESTINE: DEPARTMENT OF HEALTH. ANNUAL REPORT FOR YEAR 1941. pp. 6–9. With 1 folding map. [**Plague.**]

The trapping and laboratory examination of rats has been a routine in Palestine since 1920; it proved its value in Haifa in 1941, when plague was demonstrated in a rodent taken in the port. Fortunately the harbour is of recent construction and during the building close attention had been paid to rat proofing. Energetic measures were taken at once, but 2 months later the first human case occurred, and nine others were reported during the year. Treatment with sulphapyridine was given and there were no deaths; inoculation with plague vaccine was confined to contacts.

Measures against rats included trapping and demolition of rat harbourages; 4,000 wood and tin shacks were dealt with. Rat proofing was undertaken extensively at a cost of £7,000. Demolition resulted in eviction of over 400 families and accommodation had to be found for the people; credits of £10,000 were given to those prepared to replace their shacks by stone houses.

At the beginning of the outbreak the proportion of *R. rattus* was 63 per cent. of the rats obtained; at the end of the year it was 2·7 per cent. *X. cheopis* was by far the commonest flea. Rat destruction was carried out by trapping or killing with batons; poisoning with bait, smoke or other methods was not adopted. *C. W.*

BERKMAN (Sam). **Accessory Growth Factor Requirements of the Members of the Genus Pasteurella.**—*Jl. Infect. Dis.* 1942. Nov.–Dec. Vol. 71. No. 3. pp. 201–211. [Refs. in footnotes.]

The genus Pasteurella is regarded as made up of three sub-groups of well defined type: (1) Haemorrhagic septicaemia organisms, (2) the tularaemia organism, which is placed among the Pasteurellas, and (3) the two closely related organisms *P. pestis* and *P. pseudotuberculosis*. This division is founded primarily on the distinctive diseases caused by the several organisms in man or animals and on immunological relationships. Confirmation of the soundness of the classification is obtained by investigating their growth requirements in nutrient media. Two classes of basal medium were employed, one a hydrolysed purified gelatin with amino-acids, inorganic salts and glucose, the other a medium which dispensed with the hydrolysed gelatin and had a definite chemical composition in which the usual amino-acids necessary for growth were represented. More interesting still than the use of

the synthetic media themselves are the experiments made on the results of addition to these basal media of accessory growth substances or their derivatives. By a process of progressive simplification in the composition of the media it was found which of the accessory growth substances was really essential. The nutritional requirements of the three subgroups mentioned varied very distinctly. Some of the accessory substances, or substances thought to be such, were: nicotinamide, thiamin, cocarboxylase, riboflavin, pantothenic acid, diphosphopyridine nucleotide, biotin concentrate, nicotinic acid, vitamin K, choline, para-amino-benzoic acid, oleic acid. It was found that: (1) "The hemorrhagic septicemia pasteurellas developed in a hydrolyzed gelatin basal medium when nicotinamide (or di- or triphosphopyridine nucleotide) and pantothenic acid were added." Nicotinic acid was not a substitute for these substances. (2) "*Past. tularense* grew slowly in a hydrolyzed gelatin basal medium plus thiamin or cocarboxylase. These cultures did not develop in an amino acid medium with the addition of known accessory growth factors." (3) *Past. pestis* and *Past pseudotuberculosis* were comparatively easily grown, requiring none of the known accessory growth factors and developing well in a medium of amino acids, inorganic salts, and glucose.

W. F. Harvey.

CHOLERA.

NAPIER (L. Everard) & GUPTA (S. K.). **Survival of *Vibrio cholerae* in Gastric Juice.**—*Indian Med. Gaz.* 1942. Dec. Vol. 77. No. 12. pp. 717–721.

It has been found by PASRICHA and others that the gastric acidity in cholera convalescents is consistently low, only 12 per cent. having been found to show even a normal curve. The explanation of this fact is that (1) it is the after-result of cholera, (2) it is a factor which has contributed to the cholera infection; persons with a low acid curve are more liable to get cholera. The present authors support the second of these views by their experiments, given in four tables:—Table I, Effect of different samples of gastric juice on cholera vibrio cultures in a case of hyperchlorhydria. Table II, Effect of different samples of gastric juice on cholera vibrio cultures in a case of hypochlorhydria. Table III, Chart showing life of cholera vibrios in hours in gastric juice of different ranges of free and total acidity. Table IV, Life of cholera vibrios in diluted gastric juice in 10 cases. Their conclusions are:—"Cholera vibrios are killed very rapidly when they come in contact with gastric juice with an acidity of 22 degrees or more, and in the presence of any free acid they do not survive long. In the absence of acid they may survive up to 15 days. Whilst admittedly the gastric juice is subjected to considerable dilution *in vivo*, the presence of even small amounts of free hydrochloric acid is so fatal to the vibrio that it seems justifiable to conclude that the individual with a low-acid gastric juice may be much more susceptible to cholera infection than the individual with a normal or high acid content." *W. F. Harvey.*

RANTA (L. E.) & DOLMAN (C. E.). **Observations on Cholera Vaccine.**—*Canadian Jl. Public Health.* 1943. Jan. Vol. 34. No. 1. pp. 26–37. [12 refs.]

Under war conditions, with the possibility of service in tropical countries, the advisability of making and standardizing cholera vaccine in bulk was early considered in Canada. A satisfactory method of assay of cholera vaccine has been sought for and for the most part this has reduced to titration of agglutinin production. It was well recognized, of course, that agglutination response was far from being a satisfactory test of immunity. Still it was undoubtedly one form of antigenic response. Injection of heat-killed, phenol-killed and formalin-killed *V. cholerae* suspensions into rabbits resulted in the highest and best maintained "O" and "OH" titres being evoked by phenol-killed vaccine. One important factor in the provision of vaccines for troops is that protection is required against more than one disease. Admixture of cholera vaccine with T.A.B.T. occasioned no significant loss in the capacity of the mixture to produce typhoid and cholera "O" and "OH" agglutinins in rabbits. Some preliminary experiments have been carried out in the endeavour to find an animal protection test as a measure of immunization. Mice seemed to be suitable animals for the purpose especially since the experiments of GRIFFITTS [this *Bulletin*, 1942, Vol. 39, p. 764] have shown that the addition of mucin to a suspension of virulent *V. cholerae* increases "its killing power for young white mice at least a thousand-fold." This effect of mucin was confirmed, and "all six strains now used in the manufacture of Connaught Laboratories vaccine will regularly kill within 72 hours at least 60 per cent. of young mice injected intraperitoneally with 500,000 mucinized vibrios." A mouse protection method of assaying the antigenic potency of cholera vaccine has been tentatively put forward by the National Institute of Health at Washington, and is based upon the percentage survival of mice tested with mucinized suspensions. This requirement is that "at least 50 per cent. of the mice in each vaccinated group should survive for 72 hours while at least 75 per cent. of the non-vaccinated mice should die of cholera septicaemia within 72 hours."

W. F. Harvey.

BACILLARY DYSENTERY.

FAIRLEY (N. Hamilton) & BOYD (J. S. K.). **Dysentery in the Middle East with Special Reference to Sulphaguanidine Treatment.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1943. Mar. Vol. 36. No. 5. pp. 253–278. [15 refs.] Discussion pp. 279–286 [CRUICKSHANK (Robert); MANSON-BAHR (Philip); SMYLY (H. J.); BOLAND (E. R.); RIDING (D.); FELIX (A.); FAIRLEY (N. Hamilton) (in reply)].

This paper must be regarded as an amplification of the work already reviewed [see this *Bulletin*, 1942, Vol. 39, p. 319]. The outstanding feature of bacillary dysentery in the Army during 1940 and 1941 has been its mild character; even in Shiga infections, the mortality has not been as high as was expected, and there has been an absence of large-scale epidemics.

Motor transport and mechanization have eliminated the chief sources of fly breeding, whilst field and stationary camp sanitation has reached a higher level than during the 1914–1918 war.

In tropical countries, such as Java, bacillary dysentery is mainly a water-borne disease and prevention consists in water sterilization, but in the Middle East there has been no difficulty in maintaining a safe water-supply and infection is mainly fly-borne, but uncooked food such as lettuce is always suspect, as human excrement is so often used as fertilizer. In forward areas it is not possible to dig trench latrines, therefore troops are instructed to scoop out a shallow hole and cover up the excreta immediately with a thin layer of loose earth or sand to prevent immediate access of flies and to permit subsequent desiccation.

Food must be protected from flies along lines of communication: it has been found that desert flies dislike entering any roofed structure which is darker inside than out.

Fly-proof latrines are essential. In order to prevent promiscuous defaecation deep trench latrines of the Moslem type were provided with fly-proofed superstructures and covers which closed automatically.

Dysentery cases were nursed in special wards, sited, wherever possible, close to the laboratory. A wire-screened room in the rear of the ward contained a screened cupboard to hold bed-pans, an incinerator, and two copper boilers for sterilizing bed-pans. Incineration of faeces mixed with sawdust gave out no objectionable odour.

A standard method was employed for isolation and classification of dysentery bacilli: organisms were grouped into the non-mannitol and mannitol-fermenting groups: the former embracing Shiga and Schmitz bacilli, the latter Sonne's bacillus and the Flexner-Boyd group.

Antisera were provided to permit identification: two polyvalent sera covered the Flexner and Boyd I groups. Analysis of 8,665 cases of dysentery in which the causal organism was isolated is given:—

Entamoeba histolytica	12·3 per cent.
Bact. dysenteriae Shiga	15·8 ,, ,,
,, ,, Schmitz	5·2 ,, ,,
,, ,, Sonne	6·3 ,, ,,
,, ,, Flexner-Boyd I	52·3 ,, ,,
Other non-mannitol fermenters	3·6 ,, ,,
Other mannitol fermenters	4·5 ,, ,,

Successful isolation depends upon freshness and absence of faecal matter. More successful results are now being obtained with the new desoxycholate medium. Where specimens have to be sent for some distance the mucus should be placed in 30 per cent. glycerine in normal saline, adjusted with sodium phosphate to pHS and tinted with phenol red—as an indicator against acidity.

The value of the diagnostic cellular exudate has been amply confirmed, but as the case advances, so the cellular composition changes. Sigmoidoscopy has proved of value in subacute cases which fail to clear up within three weeks and in differential diagnosis from amoebiasis.

In cases where dysenteric symptoms persist longer than the third week the mucous membrane may remain universally inflamed, or it may be normal, or limited areas may show ulceration due to *Bact. dysenteriae* (especially Flexner). These constitute a large proportion of carriers of the infection.

In severe chronic bacillary dysentery the large intestine may be tubular in outline, the walls thickened, contracted and difficult to distend; the surface composed of red granulation tissue sometimes with pseudopolypi.

In others superficial oval or circular ulcers are seen scattered over apparently normal mucosa and from these *Bact. dysenteriae*, Shiga, has been isolated. Most Flexner cases were mild and dehydration did not develop. On the other hand "febrile diarrhoea" in which numerous stools were passed, proved to be bacillary dysentery.

Acute fulminating Shiga dysentery was rare, but in one case death supervened within a period of 32 hours. In cases with insidious onset severe intestinal symptoms and fever may not supervene for several days, but as the infection progresses, so toxaemia increases.

Occasionally renal failure was noted with albuminuria, granular casts and nitrogenous retention. Oliguria, abdominal distension and hiccup are characteristic of this condition. The complications of both Shiga and Flexner types of bacillary dysentery were infrequent and mainly encountered in severe infections. They were intestinal haemorrhage, perforation with peritonitis, chronic peritonitis with localized or general effusion of peritoneal fluid, pneumoperitoneum in one case, portal pyaemia and multiple abscesses of the liver, haemorrhoids, sometimes thrombosed, and rectal prolapse. The systemic complications were: peripheral circulatory and renal failure, toxic arthritis, peripheral neuritis, conjunctivitis and iritis, pneumonia, parotitis, petechial and purpuric rashes.

Renal failure has clinical resemblances to that of traumatic anuria (crush injury) and results from a combination of factors in which dehydration and toxaemia play an important part leading to reduced glomerular filtration and degenerative changes in the tubules.

The urine contains granular casts and albumin and there is azotaemia, and oliguria which may pass on to anuria.

Renal failure of this type occurs in patients who have never received sulphaguanidine and therefore it cannot be attributed to this drug.

In routine treatment sodium or magnesium sulphate therapy was employed on the accepted lines for five days. For the first 24–36 hours water only was permitted, to which was added glucose, lactose or saccharose, subsequently albumin and barley water, tea and chicken broth. Refined anti-dysenteric Shiga serum (20,000 I.U. per cc.) in doses of 5 to 10 cc. (100,000–200,000 I.U.) was given intravenously and repeated daily. No serum reactions were noted in a series of over thirty cases.

Benefit obtained was transient and improvement not maintained. It should be reserved for fulminating or severely toxic cases immediately on admission to hospital. The action of sulphaguanidine and anti-dysenteric Shiga serum in Shiga infection is complementary since the former exerts a bacteriostatic action on dysentery bacilli, whilst the latter neutralizes Shiga exotoxin. The portion of the paper dealing with sulphaguanidine treatment has already been abstracted [see this *Bulletin*, 1942, Vol. 39, p. 319].

Regarding excretion, sulphaguanidine is conjugated to a variable degree, but both it and acetylsulphaguanidine are soluble in urine at *p*H 7·1. There is no advantage in alkalinizing the urine with a view to preventing deposition in the tubules. Crystals may appear in the urine during the first week, but in the series of 371 cases treated with

sulphaguanidine there was no instance of renal complication, such as haematuria. *P. Manson-Bahr.*

WEIL (A. J.). **Progress in the Study of Bacillary Dysentery.**—*Jl. Immunology.* 1943. Jan. Vol. 46. No. 1. pp. 13–46. [286 refs.] [Summary appears also in *Bulletin of Hygiene.*]

This is a review of the present state of our knowledge of the epidemiological and bacteriological aspects of bacillary dysentery. There are numerous references to the recent literature, most of which has been abstracted in the *Bulletin of Hygiene* or this *Bulletin.*

The importance of the subject is indicated by the figures of dysentery notifications in the United States (21 States). These show that, while the incidence of the enteric fevers has fallen strikingly during the years 1933–40, that of dysentery has not done so. Further, probably only severe cases are notified, so that, if the probable number of cases of dysentery is calculated from the known number of deaths and the average case-mortality, it is likely that about 700,000 cases (instead of the reported 79,000) occurred in these States in the years 1933–37.

Survey of the epidemiological reports suggests that dysentery incidence is the best indicator of the effectiveness of public sanitation. The immediate vehicle of infection is usually contaminated food, with milk and cream playing a considerable rôle. The part played by flies is probably small. [This is a view which is not shared by recent workers in the Middle East, though it may be true of the United States.]

Dysenteric infection is carried from one locality to another by man, and the number of permanent and convalescent temporary carriers has probably been underrated in the past. The new methods of culture have shown that patients with chronic dysentery excrete the organism more profusely than was thought, but, since these individuals are mostly incapacitated, they are not likely to play a great part in the spread of the disease.

Measures of control, in addition to modern methods of sanitation, should include dissemination of information on the present aspects of dysentery amongst the medical profession, emphasizing the importance of bacteriological diagnosis, of discarding vague diagnostic terms ("intestinal influenza," "acclimatization diarrhoea" and the like) and of being on the alert for dysentery with atypical clinical manifestations.

The rest of the paper contains a review of our knowledge of the bacteriology of the dysentery group, the chemistry and toxic effects of the various antigenic fractions isolated from the bacteria, and sulphonamide treatment, subjects which have recently received attention in this *Bulletin* and the *Bulletin of Hygiene.* *J. C. Cruickshank.*

LYON (George M.). **The Chemotherapy of Bacillary Dysentery. Further Observations on Sulfaguanidine.**—*Jl. Lab. & Clin. Med.* 1943. Feb. Vol. 28. No. 5. pp. 645–650.

This is a general account of the use of sulphaguanidine in bacillary dysentery and adds little to previous communications. It is concluded that sulphaguanidine has completely revolutionized the treatment of acute bacillary dysentery and is as effective as is sulphanilamide in the treatment of some streptococcal infections. A footnote is added

on the result of treatment of 14 patients, with severe or moderately severe bacillary dysentery, with succinyl sulphathiazole. The initial dose, 0·08 gm. per kilo., was graded as twice the maintenance dose. The latter (0·04 gm. per kilo.) was given every four hours if six doses were exhibited daily, or 0·05 gm. per kilo. if five doses were given daily at 4 hour intervals. After the diarrhoea had ceased for 72 hours the drug was discontinued.

In this comparatively small series succinyl sulphathiazole had all the virtues of sulphaguanidine, was free from untoward effects and was exceedingly well tolerated. *P. Manson-Bahr.*

RELAPSING FEVER.

POSPELOVA-SHTROM (M. V.). *Ornithodoros tartakovskyi* **Ol., 1931 as a Vector of Tick Spirochaetosis.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1940. Vol. 9. No. 6. pp. 618–622. [In Russian.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1943. Mar. Vol. 31. Pt. 3. pp. 58–59.]

Ornithodoros tartakovskyi, Olenev, is common in the burrows of small rodents in the desert-steppe regions of Central Asia, but has not been recorded from dwellings. Investigations to determine whether it is a vector of relapsing fever were carried out in Moscow in the summer of 1939 with nymphs and adults collected in April from the burrows of hedgehogs near Ashkhabad, in south-western Turkmenistan. Spirochaetosis was produced in laboratory mice by the feeding of the ticks, which showed that the latter were naturally infected. The strain obtained was maintained by serial passage in mice and was not pathogenic to guineapigs; it did not even cause a latent infection in them. The infected ticks did not, however, always transmit the disease to mice. In cases of transmission, the incubation period lasted 5–8 days, the spirochaetes usually appearing on the sixth day. Injection of blood from the mice caused a transient infection (occasionally latent) in rabbits and white mice, but did not infect a hedgehog (*Erinaceus europaeus*), goldfinch or tortoise. Jerboas (Meriones) from Daghestan, where *O. tartakovskyi* does not occur, proved highly susceptible to infection produced by intraperitoneal injection of a suspension of the internal organs of ticks that had died 3–4 hours previously. It is suggested that jerboas, probably including *Rhombomys opimus*, which occurs in Central Asia and is often associated with *O. tartakovskyi*, may serve as reservoirs of this strain of spirochaete in nature. It differs from the strain transmitted by other species of *Ornithodoros*, such as *O. tholozani*, Lab. & Mégn. (*papillipes*, Bir.) and *O. verrucosus*, Olenev, Zas. & Fen., in its pathogenicity to laboratory animals and the characteristics of the disease it produces, and is probably identical with the species named *Spirochaeta latyschewi* by Sofiev. [See this *Bulletin*, 1943, Vol. 40, p. 314.]

MAZZOTTI (Luis). Estudio sobre la transmision de *Spirochaeta venezuelensis*. [**On the Transmission of** *Spirochaeta venezuelensis*.]—*Rev Inst. Salubridad y Enfermedades Trop.* Mexico. 1942. Dec. Vol. 3. No. 4. pp. 297–301. English summary (5 lines).

That relapsing fever, as seen in Panama, Colombia and Venezuela, is caused by one species only of spirochaete, *Sp. venezuelensis*, and that this is transmitted by *Ornithodorus venezuelensis* and *O. talajé* with equal facility are generally accepted as facts. G. E. DAVIS has recorded finding naturally infected *O. talajé* in the United States and transmitted the infection by the bite of ten specimens collected in Arizona. In 1941 Dr. Luis Mazotti collected specimens of *O. venezuelensis* in Girón, Colombia, which he proved to be infective. *O. venezuelensis*, he states, is not found in Mexico and is difficult to rear in the laboratory, so he attempted to keep the strain going in *O. talajé*. He then carried out experiments with 14, 15 and 17 of the ticks which had fed on a rodent infected with *Sp. venezuelensis* 78, 60 and 60 days before and set them to bite healthy rats. Examination of the latter carried out systematically during a fortnight did not reveal a single infection. He next allowed six lots of *O. talajé*, 10 to 25 in each, which had fed 22 days before on rats infected with *Sp. venezuelensis*, to bite a fresh series of rats and, though examined for 19 days, all were negative with one exception which showed spirochaetes on the thirteenth day. It had been bitten by the group of ten ticks.

Lastly, triturated bodies of five specimens of *O. talajé* which had fed six months before on an animal infected with *Sp. venezuelensis* were inoculated into four healthy rats, and they became infected.

It would seem, therefore, that *O. talajé* is of very little importance epidemiologically in the transmission of *Sp. venezuelensis*. Also, the readiness with which Davis obtained transmission with *O. talajé* points rather to the possibility that the spirochaete he found was a different species or a different strain of *Sp. venezuelensis* and that the usually recognized spirochaete, recognized, that is, as *Sp. venezuelensis*, is biologically different from those transmitted in nature by *O. talajé*. [An interesting paper opening up a wide field for further research.]

H. Harold Scott.

WHEELER (Charles M.). **A Contribution to the Biology of** *Ornithodoros hermsi* **Wheeler, Herms and Meyer.**—*Jl. Parasitology.* 1943. Feb. Vol. 29. No. 1. pp. 33–41. With 2 figs. [15 refs.]

YAWS.

SCHRAMM (Eberhard). Die Behandlung der Frambösie mit Spirobismol. [**Spirobismol in the Treatment of Yaws.**]—*Deut. Trop. Ztschr.* 1942. Dec. 15. Vol. 46. No. 24. pp. 605–606.

The author, when practising in Liberia noted, as have all tropical practitioners, that the natives will not persevere in a lengthened course of treatment nor can they afford expensive drugs such as aminoarsenobenzol; hence the value of a cheap drug which brings about speedy cure. This the author has found in Spirobismol, a

combination of bismuth, quinine and iodine. It is well tolerated and though he has treated many hundreds of patients he had not seen a single case of bismuth poisoning. The dosage is 3–5 cc. (=0·09–0·15 gm. bismuth) for adults, 1–2 cc. for children and 0·3–0·5 cc. for infants. Injections are made deep intramuscularly on alternate days. After three to four injections the mother-yaw or secondaries clear. In tertiary yaws with lesions of the soft palate or sole, or periostitis of tibia or ulna, healing is slower and the author finds the best treatment to be 3–5 injections of aminoarsenobenzol followed by the Spirobismol. He concludes that Spirobismol is the most serviceable remedy for rapid, cheap and certain healing of yaws for a physician in the tropics who has to undertake journeys in adverse conditions and treat large numbers of patients. *H. Harold Scott.*

BOLETIM DO SERVIÇO DE FRAMBOÉZIA. Minas Gerais. 1941. Vol. 5. No. 5. 4 pp.—O servico de framboézia. [**The Yaws Service in the State of Minas Gerais.**]

This is a brief note of the work done in recent years by this organization, which also assumes the treatment of leishmaniasis, malaria, tropical ulcer and other conditions. The Service includes a number of centres working under a single direction. Since 1934, 25,186 persons have been treated for yaws. *C. W.*

IRIARTE (David R.). La buba o bubas en Venezuela. [**Yaws in Venezuela.**]—*Rev. Facul. de Med.* Bogotá. 1942. June. Vol. 10. No. 12. pp. 767–781.

A general account of the disease, containing much information which has already been abstracted in this *Bulletin.* *C. W.*

LEPROSY.

LEPROSY IN INDIA. 1942. Oct. Vol. 14. No. 4. pp. 141–149.—**Report for 1941 of the Leprosy Research Department, School of Tropical Medicine, Calcutta.**

VERGHESE (G.) & RATH (R. C.). **Epidemiological Features of Leprosy in Orissa.**—*Leprosy in India.* 1942. Oct. Vol. 14. No. 4. pp. 130–138.

The recently (1936) created province of Orissa, situated to the south of Bengal and extending from the east coast to the east of the Central Provinces, has a population of 8,600,000. Leprosy is widespread, especially in the more humid coastal divisions. Surveys of the villages around certain dispensaries have been followed by inquiries in selected areas in each of the six divisions of the province, the results of which are recorded in this paper; 226,122 persons out of nearly 500,000 in the areas were examined with the following results. The incidence among those examined was 1·3 per cent., a fairly high rate, and the total number of cases for the whole province is estimated at about 100,000. Classifications of 3,000 cases showed that 2,065 were neural and 935 lepromatous, *i.e.* 31 per cent. were of the more

severe and infectious form. Males contributed 74·5 per cent., but probably a smaller proportion of females were examined. Children under 15 numbered 400. Agricultural colonies are advised for the isolation of lepromatous cases. *L. Rogers.*

CASTAÑE DECOUD (Anibal). Infiltración neural para-arterial en la lepra tuberculoide. Su importancia en el diagnóstico histológico. [**Para-arterial Neural Infiltration in Tuberculoid Leprosy.**]—*Rev. Argentina de Dermatosifilologia.* 1942. Vol. 26. Pt. 4. pp. 913–924. With 10 figs.

In 1940, states the author, he made a communication on the importance of neuritis in histological differentiation of leprosy from other tuberculoid granulomata [he does not give the reference]. The histological changes are well shown in a series of photomicrographs and he sums up the lesions in five grades or phases :—

1. Neural infiltration without involvement of artery.
2. Neural infiltration with displacement of artery.
3. Neural infiltration with partial infiltration of artery.
4. Infiltration of nerves and artery.
5. Para-arterial infiltration, tuberculoid or lymphocytic, the nerve fibres being absent, perhaps owing to destruction.

The term " para-arterial neural infiltration " is applied to the first three, more especially to the second and third, of these phases. Examining sections of tissues, the author found this infiltration in 37 out of 50 cases. Of the other 13, five showed neuritis, but there were no arteries in the field, and in eight the nerves could not be identified.

He sums up by saying that in tuberculoid leprosy the infiltration has a peculiar and characteristic distribution, starting around the nerve fibres, displacing but not invading the vascular structures—" para-arterial neural infiltration "—a condition which is not found in non-leprous granulomata. *H. Harold Scott.*

SCHUJMAN (Salomon) & VACCARO (Agustin). Las adenopatias leprosas. Estudio clínico, histológico y bacteriológico comparativo de los ganglios en las formas lepromatosas y neural tuberculoides. [**Adenopathy in Leprosy.**]—*Rev. Argentina de Dermatosifilologia.* 1942. Vol. 26. Pt. 4. pp. 925–940. With 6 figs. [15 refs.] English summary.

The authors have made a study of the gland changes—clinical, bacteriological and histological—in 150 cases of the lepromatous form, and 50 of the neural tuberculoid form of leprosy. The bacteriological examination was made in 80 and the histological in 25 cases. They also inoculated guineapigs subcutaneously and intraperitoneally with emulsions of the glands in 50 cases, but all with negative results.

Clinically, the order of frequency of involvement was axillary, inguinal, cervical and epitrochlear. They were never suppurating ; they varied in size from " a lentil to a small nut," largest and most numerous at the time of a leprous reaction. Bacteriologically, o tuberculoid cases in which the glands were punctured only one was positive ; of those examined by biopsy three were positive and all were in a state of " tuberculoid reaction." Histologically, there is nothing fresh recorded.

They found enlargement of the glands was much more common in the lepromatous cases (96 per cent.), whereas in the tuberculoid forms it was present in 60 per cent. only, and most of these at the time of a reaction. In both, the glands are non-suppurating, painless, covered by normal skin and not adherent (but in two of the lepromatous there was chronic suppuration with fistulae). There seems to be no relation between the severity, number and extent of the skin lesions and enlargement of the glands draining the area. *H. Harold Scott.*

DHARMENDRA. **Studies of the Lepromin Test. (9) A Bacillary Antigen standardised by Weight.**—*Leprosy in India.* 1942. Oct. Vol. 14. No. 4. pp. 122–129.

This paper records a further advance in obtaining a standardized lepromin for the Mitsuda test. The suspensions hitherto made from leprosy nodules contained some tissue elements as well as the lepra bacilli. The latter have now been obtained in a pure form by the following method: Material from a leproma (usually from the ear) is sterilized in the autoclave and then ground in a mortar in chloroform, using 50 cc. to 2 grammes of lepromatous tissue. The chloroform is pipetted off and the process is repeated until a smear of the remaining tissue is almost free from bacilli and on evaporating the chloroform on a water bath only bacilli and lipoids remain. This residue is then suspended in ether and centrifuged to remove the lipoids and the deposited bacilli are separated and dried in a vacuum. They will be found to have retained their antigenic property. This is strongest when the powdered bacilli are further treated with chloroform for four days in a refrigerator. Standard lepromin is prepared by suspending 1 mgm. of the dried bacterial powder in 10 cc. of carbol-saline and the routine dose for the test is 0·1 cc. of this (containing 0·01 mgm. of the bacterial powder) which can be conveniently kept in 1 mgm. or 0·1 mgm. quantities in sealed ampoules from which fresh suspensions can be made.

With this antigen the early reactions are stronger and the late ones considerably weaker than with ordinary lepromin, which are advantages. In the vast majority of neural cases reactions are obtained and in the vast majority of lepromatous ones no early or late reactions are produced. *L. Rogers.*

PAN (C. S.). **A Clinical Evaluation of the Lepromin Test.**—*Arch. Dermat. & Syph.* 1942. Dec. Vol. 46. No. 6. pp. 792–795.

The author first refers to the original work of MITSUDA in introducing the test now known by his name or more commonly as the lepromin test, and he mentions some later observations, but these do not include those of LOWE and his colleagues in Calcutta. He goes on to report on his own studies in Shanghai among different types of leprosy, and in 10 contacts and 24 controls; 9 of the 10 contacts and 20 of the 24 controls gave positive results. On the other hand only 1 of 37 (2·5 per cent.) of cutaneous cases, and none of 11 mixed ones gave a positive reaction; 17 of 21 neural and all 7 tuberculoid ones reacted. In 27 leprosy cases, as well as in all the contacts and controls, the Mantoux tuberculin test was also carried out, but the two reactions were only in agreement in five of the leprosy cases. Histological investigations showed giant-cell formation such as results from reactions to a foreign body.

The author concludes that he is in agreement with other observers that the lepromin test does not serve well as a diagnostic procedure in leprosy. *L. Rogers.*

ALBARRACÍN (Leopoldo). Algunas consideraciones sobre la medicación antileprosa por el aceite de hydnocarpus y sus esteres etílicos. [**The Treatment of Leprosy by Oil of Chaulmoogra and its Ethyl-Esters.**]—*Bol. Inst. Nac. de Hig. Samper Martinez.* Bogotá. 1943. Jan. No. 10. pp. 9–27.

A good general account of the treatment of leprosy by chaulmoogra. The author gives a brief description of the oil and its extraction, the possibilities of adulteration, the preparation and purification of the esters, the dosage, the need for treating concomitant conditions, such as helminthic infestations, syphilis and tuberculosis, if the best effect is to be obtained from the specific drug. The whole is a sort of review article, interestingly written, but bringing forward no facts not already known to readers of this *Bulletin.* *H. Harold Scott.*

HELMINTHIASIS.

SCOTT (J. Allen). **The Natural Pattern of Dilution Counts of Helminth Eggs.**—*Amer. Jl. Trop. Med.* 1942. Nov. Vol. 22. No. 6. pp. 647–654. With 4 figs.

The permanent value of dilution counts has been questioned in recent years ; but workers have used the method in very different fields of work ; for instance, the public health official favours it because it gives him an adequate conception of the level of infection in a community, the clinician finds it very erratic in individual cases, the experimentalist obtains good results only when he makes multiple observations which reduce the fluctuations of random error and he may not realize that, in surveys, this variation is compensated by the fact that the distribution of observations from a natural population follows a definite pattern. There is also a great diversity in the methods used for presenting the data, so that the work of different authors cannot be compared.

Limiting his discussion to the use of Stoll and Hausheer's dilution method, the author shows that egg count data (counts of eggs of Ascaris and hookworms are illustrated) from a natural human population group " form a J shaped curve as ordinarily plotted, since most persons pass small numbers of eggs while relatively few pass very many. When the data are plotted on a logarithmic scale, an approximate normal curve results only when the average is unusually high and the number of cases lost below the lower counting limit is therefore unappreciable. Data presented here demonstrate that most averages of egg counts have been unequally biased by the variable size of this missing portion of the curve. Statistical analysis of the data on a logarithmic scale requires no special mathematical knowledge and offers certain definite advantages. The resulting constants, although expressed in compact form, provide material for such additional analyses and comparisons as the reader may wish to make. In addition, visualization of the data is easier on a logarithmic scale."

Scott will publish later an account of practical methods of handling egg counts in accordance with the theoretical principles here discussed.

G. Lapage.

SENRA (Juvenal) & FELICISSIMO (Olavo). Contribuição ao estudo das parasitoses humanas em Belo Horizonte. [**Parasitism in Children (in an Institution) in Bello Horizonte.**]—*Brasil-Medico.* 1942. Dec. 5 & 12. Vol. 56. Nos. 49 & 50. pp. 547–549. [10 refs.]

The institution in question, the Casa do Pequeno Jornaleiro, has 250 inmates, but of 92 only were the faeces examined for helminth parasites. Bearing in mind how small the total is we, nevertheless, find results of considerable importance. The method employed was the sedimentation technique of Hoffmann, Pons and Janner; after the supernatant fluid had been decanted the deposit was again washed and again allowed to settle for at least 30 minutes and then spread on three slides, the material being again washed and sedimented from the first to provide for the second examination.

Of the 92, four only were negative, and of the 88 positive, 14 harboured one species only, 35 two, 27 three, 9 four and 3 five species. The authors' findings of the different helminths are given in a Table as percentages, and in the same Table are the findings in seven other investigations between 1937 and 1942. The authors found *Necator americanus* the commonest (72·8 per cent.), *Trichuris trichiura* next (53·2 per cent.), *Schistosoma mansoni* in 46·7, *Ascaris lumbricoides* in 39·1, *Strongyloides stercoralis* in 25, *Enterobius vermicularis* and Taenia sp. each 1·08 per cent. The figures are given by the authors in percentages, presumably in order that they may be compared with the seven other series where they are similarly stated. The actual figures among the 92 cases examined would be 67, 49, 43, 36, 23 and 1 respectively.

H. Harold Scott.

CAMPBELL-BEGG (R.). **Why is Bilharzial Disease so frequently undiagnosed ?**—Reprinted from *Leech.* 1942. Nov. Vol. 13. No. 2. pp. 7–9.

The author discusses a common form of bilharzia which often remains undiagnosed for years, because the symptoms are obscure and are not generally known to be associated with bilharzia.

Three cases are described, all of them seen on one afternoon; they are selected from " some 100 " others.

Case 1, a male, aged 27, complained of disabling pain in the left inguinal region, without urinary symptoms except slight tingling at the end of the penis when micturating. He had acquired schistosomiasis at the age of 16 and had been given 40 " injections." No eggs were then found in the urine and he was pronounced cured. But he had not felt well since and had often had to give up work because of disabling pain in the lower abdomen. Examination revealed marked tenderness along the line of the ureter in the left inguinal region. The urine was normal. Cystoscopy showed several patches of " active bilharzia." The lower 15 cm. of each ureter were sticky to the passage of catheters, but there was no stricture. The diagnosis was active schistosomiasis in and around the bladder and lower part of the ureters.

Case 2, a male, aged 29, complained of abdominal pain, frequent micturition day and night and inability to work. At the age of 23 he had seen a little blood in the urine on one day, but no eggs of

Schistosoma were found, and he was told it was not due to schistosomiasis. A year or so later the present symptoms began. Examination showed tenderness in the suprapubic region and along both ureters and over the right superior lumbar trigone. The urine was normal, without eggs of Schistosoma. Cystoscopy showed fresh and old-standing patches of schistosomiasis scattered over the bladder; the ureters were sticky to catheters, but were without strictures. The diagnosis was as for Case 1.

Case 3, a female, aged 31, married, complained of aching, spasmodic pain in the back and right inguinal region. She married at the age of 21 and, during that year, when she was 4 months pregnant, she had severe right renal colic, which remained throughout pregnancy and ended when a 7-months child was born. But it persisted and, four years later, when she was again pregnant, the renal colic returned. There was a premature birth and the child died. Her troubles persisted for the next six years. Pyelitis was diagnosed, but no eggs of Schistosoma were found in the urine. Examination showed tenderness in the right renal region and along the right ureter. The urine was normal, without eggs. Cystoscopy showed very obvious schistosomiasis of the bladder.

A large number of similar cases have led the author to the following conclusions: (1) The presence of Schistosoma cannot be excluded, even if the patient has not lived in areas known to be infested or has not paddled or bathed in ponds or rivers. (2) The first infestation may cause no symptoms. (3) The absence of eggs of Schistosoma from the urine is no proof of the absence of the infestation. In most cases, except at the very onset of the attack, no eggs will be found in the urine. Even if eggs are passed from time to time, the chances are remote that the urine will be examined at one of these times. Repeated examinations of the urine of patients being treated while the disease is very active may reveal no eggs, so that this test is completely misleading as a test of cure. In only 3 per cent. of the author's cases, which were proved by cystoscopy to have active schistosomiasis, were eggs found in the urine; in most of them the urine was clear and centrifugation produced no deposit. (4) Increase of eosinophils is more valuable than examination of the urine for eggs in fairly recent cases, but a fairly normal count of them occurs during the active disease. (5) The typical picture obtained by radiology of very advanced or neglected cases, with dilatation above strictures in the lower ureter, calcification and enormous hydronephrosis, is seen only in a minority of cases. Active schistosomiasis may go on for years without any such strictures and with normal intravenous pyelograms; the same may be true when strictures with a calibre of No. 4 F or more are present. (6) Cystoscopy shows that most cases do not show ulceration of the granulomata. Usually there are "papular formations singly or in groups." The eggs are in the submucosa and the site can usually be detected by the cystoscope. Cystoscopy is the only means of confirmation or exclusion of the disease and the only valid test of cure. It is "almost infallible."

It cannot be sufficiently emphasized that, when the disease is active, urinary dysfunction may be absent or minimal and the only symptoms may be lassitude, ill-health with or without abdominal pain and usually tenderness in the region of the kidneys or ureters. When all the parasites are dead, the sequelae of the disease are more or less dense strictures of the ureters, usually in the first 10–12 cm. above the

bladder. They produce disabling pain along the course of the ureters. In the author's experience there is a predilection for the right side and the right inguinal region. The maximum point of tenderness is the point often wrongly taught as McBurney's point and this leads to diagnosis and operation for appendicitis. South African practitioners are not sufficiently "bilharzia-conscious." The disease is the commonest cause of right inguinal pain in South Africa and is the peculiar plague of that country.

The junction of the middle and outer thirds of the line between the anterior superior iliac spine and the umbilicus lies exactly over the lowest accessible part of the ureter where it turns over the external iliac artery to descend into the pelvis. Tenderness over this point indicates ureteral pathology, and in South Africa the commonest ureteral lesions are due to schistosomiasis or to strictures following it. The junction of the appendix and the caecum is $\frac{1}{2}$–$\frac{3}{4}$ inch more lateral than this point, as McBurney emphasized. *G. Lapage.*

BLUM (Benjamin B.) & LILGA (Harris V.). **Schistosomiasis Infection: Report of Two Cases found in Northern Michigan.**—*Jl. Amer. Med. Assoc.* 1943. Jan. 9. Vol. 121. No. 2. pp. 125–126. With 1 fig.

Two cases of infestation with *Schistosoma haematobium* in Northern Michigan are recorded and the authors point out that conditions associated with the war may introduce into the United States and Canada diseases which are endemic in other countries. Most of the cases reported in the United States have been well advanced and diagnosed relatively late and the authors know of no cases which have been diagnosed before the onset of symptoms.

Case 1 was a white boy, aged 9, complaining of bloody urine for the last three months and enuresis for two days. He said the blood had appeared at the end of urination every three or four days, until it had occurred daily during the week before he was seen. His health in other respects was good. He had been born in South Africa in a region where many rivers were infested with snails.

The boy's only physical abnormality was slight tenderness in the right renal area. The haemoglobin value was 81 per cent. (13·4 gm.) with an erythrocyte count of 4,100,000. Eosinophilia as high as 11 per cent. was found. The urine was normal, except for the terminal drops in which numerous pus cells and erythrocytes and *Staphylococcus aureus* were found. He was treated with sulphathiazole and in two weeks the pyuria had disappeared and urine cultures were negative; but the terminal bleeding persisted. Repeated searches revealed, four weeks after the patient was first seen, one egg of *Schistosoma haematobium.* Urine and faecal examinations of the parents, two sisters and one brother were negative.

Case 2, the 12-year-old brother of the last, showed eggs of Schistosoma in the urine, although he had had no symptoms and terminal haematuria appeared thirteen days after these were found. His haemoglobin value was 77 per cent. (12·8 gm.) with 3,780,000 erythrocytes and 20 per cent. of eosinophils. The urine contained blood, pus, eggs of *S. haematobium* and *Staphylococcus aureus.*

Both patients were treated with fouadin. No local or systemic reactions followed. After removal of the family to another part of Michigan the younger boy again showed eggs in the urine and was

given a second course of fouadin. The mother reported that there has not been any recurrence up to September 1942.

As it is believed that there is no suitable intermediate host in the United States, there is little reason to fear the occurrence of cases other than those brought in to that country. *G. Lapage.*

SCOTT (J. Allen). La epidemiologia de la schistosomiasis en Venezuela. [**The Epidemiology of Schistosomiasis in Venezuela.**]—*Rev. Sanidad y Asistencia Social.* Caracas. 1942. Dec. Vol. 7. No. 6. pp. 771–809. With 2 figs.

This is a translation of the paper abstracted in this *Bulletin*, 1942, Vol. 39, p. 865.

CAWSTON (F. Gordon). **Safeguarding Schoolchildren from Schistosomiasis.**—Reprinted from *Clin. Proc.* 1942. Sept. Vol. 1. No. 9. pp. 311–314. With 1 fig.

A school-boy, aged 14, complaining of painless haematuria, had been swimming in a Natal waterfall believed to be free from Schistosoma and water snails, but his urine contained eggs typical of *S. haematobium.*

During two weeks he was given 29 cc. of anthiomaline in 11 doses and the eggs disappeared for a time from the urine. The total dose during 23 days was 45 cc. An earlier case, a man aged 20, was permanently cured in 1936 by a total dose of 40 cc. of anthiomaline given during 20 days. Repeated doses of 3–4 cc. of anthiomaline are preferable to smaller ones spread over a longer time and anthiomaline is less irritating and more potent than tartar emetic.

Among school-children most of the parasites are males or immature worms causing slight enlargement of the liver and an increase of eosinophils. Eggs tend to stay in the bladder till the last portion of urine is passed. Complete eradication of the parasite is essential. The author thinks that large numbers of " successfully destroyed worms " increase " acquired powers of resistance " to the parasite.

Physopsis africana was found in the mud above the waterfall in which the patient bathed and there were well frequented native paths to the water there. The European owner had had bilharzia. This snail was the only one which survived oiling of the pools and the other anti-mosquito measures in other localities, but these measures kill its natural enemies and so favour its multiplication. Forcible disturbance of water by pumping destroys many larvae, infestation being most often acquired in still, shallow water. The only effective method of destroying the snails is the removal of all vegetation from the waterways liming the soil and prevention of human fouling of the water. Ducks feed greedily on *P. africana*, but neither these nor the hedgehog can eradicate it completely. *G. Lapage.*

BONNE (C.). **Researches on Sparganosis in the Netherlands East Indies.**—*Amer. Jl. Trop. Med.* 1942. Nov. Vol. 22. No. 6. pp. 643–645.

Spargonosis is rare in man in the Malayan archipelago. VON RÖMER (*Arch. f. Schiffs- u. Trop.-Hyg.*, 1910, Vol. 14, p. 289) found a sparganum in the bladder of one man and Bonne found one in the pulmonary artery of a Malayan—a very unusual habitat. DE HARTOGH found

that sparganosis is very common in frogs near Batavia, the corresponding tapeworms (species of Diphyllobothrium) being found in cats and, less often, in dogs ; he infested kittens with *Diphyllobothrium ranarum* (named by Faust) by feeding them with the frogs. JOYEUX and BAER [this *Bulletin*, 1930, Vol. 27, p. 964] fed rats and guineapigs with spargana of frogs and these unsuitable hosts acquired, not intestinal infestations with Diphyllobothrium, but re-encapsulation of the spargana, *viz.* sparganosis of the dorsal muscles of the abdomen and other situations ; the spargana remained alive but did not develop further.

Bonne found spargana occasionally in monkeys, and MEYER found them occasionally in pigs. Meyer fed cats with spargana from pigs and the cats acquired infestations with tapeworms diagnosed as *D. raillieti* and *D. erinacei* by different zoologists ; these may have been *D. ranarum*. BONNE and LIE KIAN found two spargana in the wall of the small intestine of a Malayan man ; a kitten was fed with these and acquired tapeworms identified by Faust as *D. ranarum*.

GAN KOEN HAN obtained eggs deposited *in vitro* by Diphyllobothria recovered from cats. The method was demonstrated by SANDGROUND. These hatched in about 20 days at room temperature. A local species of Cyclops was very susceptible to the ciliated coracidia. In 4–9 days the procercoid larvae in the Cyclops developed a cercomer, which was thrown off after 20–32 days. Poor results followed the infestation *per os* and intraperitoneally of frogs and toads with these post-cercomer stage larvae ; but tadpoles of frogs and toads were very easily infested with them. Out of 161 frog tadpoles 44 were infested by placing them in a dish with infested Cyclops ; tadpoles placed with free-swimming coracidia remained uninfested. The spargana in the tadpoles were much smaller than those in adult frogs ; when they were given in food to cats, they required a longer time to develop into Diphyllobothria than did spargana from adult frogs. It thus seems that in nature infestation of frogs occurs, partly at any rate, in the tadpole stage ; but Gan Koen Han did not discover any naturally infested tadpoles.

Cyclops infested with post-cercomer stage, given *per os* or otherwise, to monkeys and mice, produced sparganosis in these. Probably man, like the monkey, may acquire sparganosis by ingesting spargana or Cyclops containing fully developed procercoids.

D. ranarum is common in cats and less so in dogs in the Netherlands East Indies ; the sparganum is frequent in frogs, less so in toads ; and a local Cyclops acts as the intermediate host. *G. Lapage.*

CAMPBELL (Dan H.). **Experimental Eosinophilia with Keratin from Ascaris suum and other Sources.**—*Jl. Infect. Dis.* 1942. Nov.–Dec. Vol. 71. No. 3. pp. 270–276. With 1 fig.

DE MEILLON (Botha) & GILLESPIE (J. C.). **Note on a Human Eye Worm.**—*South African Med. Jl.* 1943. Jan. 9. Vol. 17. No. 1. pp. 5–6. With 2 figs.

The authors describe one case of infestation of the eye with a nematode which could not be exactly identified, because only one female was recovered ; this appeared to resemble *Filaria conjunctivae*, Addario, 1885, more closely than any other species. So far as the authors know the infestation has not been recorded before in South Africa.

The patient, a woman, had travelled extensively in Central Africa since 1928 (Belgian Congo, Uganda, Kenya). In 1937 she developed urticaria, which recurred at intervals up to the date of her examination, but the authors are not sure that this was due to the nematode. In May 1942 a swelling appeared on the ventral proximal third of the forearm; this disappeared soon after and another appeared near the base of the forearm; no others were seen, but a week after the last swelling had gone, the right side of the face became swollen, red and painful and, while this condition lasted, the worm appeared in the lower conjunctiva of the right eye. The worm was alive and moving about; it eventually disappeared from the orbit but reappeared. It was then seen just above the lower fornix of the right eye. There was some swelling and redness of the lower conjunctiva and eyelid. The worm loop was fixed in forceps under cocaine anaesthesia, and, with its covering tissues, tied with a silk suture. Pieces of the worm, which was active, were then dissected out; about 4½ inches of it were removed. The following measurements are given with the illustrations: total length 115 mm.; width at the middle 0·5 mm.; length of the oesophagus 1·0 mm.; the nerve ring was 0·28 mm., and the vulva 2·2 mm. from the anterior end. The anus was subterminal; the vagina, which had no anterior loop, contained large numbers of what appeared to be eggs, but no embryos were seen. The cuticle was very finely striated transversely. The oesophagus was straight and without a basal bulb. Cephalic papillae were seen, but their position and number could not be made out. Examination of the blood by KNOTT's concentration method [this *Bulletin*, 1940, Vol. 37, p. 304] on both day and night blood, as well as other examinations of day and night blood, failed to reveal any microfilariae. Blood smears showed no abnormality of the red cells and no eosinophilia. *G. Lapage.*

SCHENKEN (John R.) & MOSS (Emma S.). **Enterobius Vermicularis in the Appendix. Report of a Study on 1,000 Surgically Removed Appendices.**—*Amer. Jl. Clin. Path.* 1942. Oct. Vol. 12. No. 10. pp. 509–517. With 6 charts. [17 refs.]

The authors examined 1,000 appendices removed from patients in the Charity Hospital at New Orleans. The first 600 were examined by a single centrifugation of the contents of the appendices (Group 1), the remaining 400 by repeated centrifugation until the supernatant fluid was clear (Group 2). The results show the greater efficiency of the latter method. Earlier American workers quoted have not stated their methods or have relied on gross examination of the contents or on examination of sections, neither of which is efficient. Their records of the incidence of *E. vermicularis* in the appendix vary from 1 per cent. to 18·2 per cent.; this variation is due, the authors suggest, to variation in the efficiency of the methods used rather than to the geographical distribution of the parasite. The small males are easily overlooked. Probably the female rarely lays eggs in the appendix. On slides changes of temperature and rapid drying caused rapid discharge of eggs and the authors suggest that similar physical factors determine egg-laying on the perineum.

Of the 1,000 appendices examined 23·3 per cent. were infested. The greater efficiency of repeated centrifugation (Group 2) is shown by the results. The incidence in white women was 42·1 per cent. in Group 2 and 27 per cent. in Group 1 (single centrifugation); in white males

38·3 per cent. in Group 2, and 16·3 per cent. in Group 1; in negro women 10·1 per cent. in Group 2 and 6·3 per cent. in Group 1; in negro men 12·8 per cent. in Group 2 and 7·7 per cent. in Group 1.

Of the 680 white patients 206 were infested (30·3 per cent.); of the 320 negro patients 27 were infested (8·4 per cent.). The preponderance of the parasite in whites was thus considerable. The preponderance of the eggs of *Trichuris trichiura*, *Necator americanus*, *Strongyloides stercoralis*, *Hymenolepis nana*, and *Taenia sp.* was also marked, but eggs of *Ascaris lumbricoides* were about equally numerous in both whites and negroes. Other workers have recorded the preponderance of *E. vermicularis* in the appendices of females rather than in males. Schenken and Moss found this difference significant only when the total white patients were considered. In Group 2 the improved technique revealed only a small difference between the incidences in male and female whites (females, 42·1 per cent., males, 38·3 per cent.). In negroes the difference was also small, but it was reversed (12·8 per cent. in males and 10·1 per cent. in females). The figures indicated that 65·5 per cent. of 206 infested white patients were 10–19 years old; the highest incidence (72·4 per cent.) was among white females aged 5–9 years, the next highest being 66·6 per cent. among white males aged 5–9 years. In negroes the highest incidence (17·6 per cent.) was in males aged 10–19 years, the next highest being 13·6 per cent. in females aged 10–19 years. *G. Lapage.*

LEVIN (A. J.) & EVANS (T. C.). **The Use of Roentgen Radiation in locating an Origin of Host Resistance to** *Trichinella spiralis* **Infections.**—*Jl. Parasitology.* 1942. Dec. Vol. 28. No. 6. pp. 477–483. [20 refs.]

Earlier workers have shown that roentgen or radium irradiation will inhibit the reproductive activity of *Trichinella spiralis* and that the doses of roentgen rays can be so adjusted that the intestinal phase of the parasite develops normally, but reproduction cannot take place. The present authors confirmed this, working out the necessary doses. They now find that, in rats fed with larvae exposed to 3,250, 3,500 or 3,750 Roentgens, the intestinal phase of *T. spiralis* develops, but no larvae are produced. The development of the intestinal phase in such rats does, however, induce a resistance which prevents a second infestation of the same rats. The authors conclude that the resistance originates in the host's intestine. Other authors are quoted who, by the use of other methods, have come to the conclusion that the resistance is localized in the intestine. This view is contrasted with the view of yet other authors quoted, who believe that the initial infestation induces a general immune response with the production of antibodies.

Levin and Evans suggest that roentgen rays are a tool which could be used for the study of host resistance to infestations with other helminths. WAXLER and HERRICK [*Supp. to Jl. Parasitology*, 1941, Vol. 27, p. 17] have immunized chickens to coccidiosis by feeding them with irradiated oöcysts. Levin and Evans think that technical difficulties need not prevent the feeding of young pigs with irradiated larvae of *T. spiralis*, so that they would develop resistance to trichiniasis, with the result that human trichiniasis might be eradicated; but the behaviour of irradiated larvae in the pig would have to be studied first [*cf.* STOWENS, this *Bulletin*, 1943, Vol. 40, p. 403].

G. Lapage.

DEFICIENCY DISEASES.

VEDDER (Edward B.). **A Study of the Deficiencies of Polished Rice in Relation to Beriberi.**—*Amer. Jl. Trop. Med.* 1943. Jan. Vol. 23. No. 1. pp. 43–47.

The deficiencies associated with a diet mainly of polished rice are not made good in the tropics by the limited amount of fish and vegetables taken. We are inclined to regard polished rice as deficient in thiamin and to ignore, or at least gloss over, other deficiencies, such as its being low in fat and fat-soluble vitamins, in mineral salts and protein. AYKROYD and his fellow-workers have shown that typical rice diets have an inadequate content of vitamin A, the B_2 complex and calcium. The author has carried out an interesting experiment of feeding 50 rats on a diet of polished rice and adding various synthetic constituents of vitamin B_2 as indications arose, noting the time when these occurred and the results of the additions.

The rats were given a normal diet for six days to ensure their being healthy and normal. They were then put on a diet of polished rice with thiamin, 10 microgrammes daily, but none of the vitamin B_2 complex. The rats did not grow at all on this diet. Fat-soluble vitamins were then added and a slight increase in weight resulted. On the 25th day dermatitis and patchy alopecia were observed, and relieved by pyridoxin (vitamin B_6), but there was no further growth until riboflavin was added. By the 55th day growth had again declined and signs of deficiency of pantothenic acid appears (" bloody whiskers," the result of excretion of porphyrin from the Harderian glands through the naso-lachrymal duct). Fifty microgrammes of calcium pantothenate were added daily and the symptom disappeared and growth was resumed. On the 67th day there were signs of anaemia and Fe deficiency ; so Osborne and Mendel's salt mixture was added. Thirty-three days later there was " ruffling of the fur," remedied by adding 20 mgm. of choline daily, and growth progressed well for a time. On its again declining, *p*-aminobenzoic acid and inositol, contained in yeast, were added, but the growth remained unchanged.

In the discussion the author states that, except for very short periods, growth was never adequate ; perhaps biotin or other synthetic component of the vitamin B_2 complex was lacking. Also, the long deficiency seemed to lead to some more lasting injury, for growth was not satisfactory even when the animals were given normal diet at the end of the experiment.

Vitamin A lack is a subsidiary cause of peripheral nerve degeneration (subsidiary, that is, to thiamin) and vitamin E deficiency leads to degeneration of the skeletal muscles. It may be that the advanced muscular degeneration of dry beriberi is in fact due to avitaminosis E.

The author sums up his conclusions in the following words :—

" 1. Polished rice is known to be deficient in thiamine (B_1).

2. Polished rice is also known to be deficient in the fat-soluble vitamins, A, D and E.

3. Polished rice is also deficient in inorganic salts, particularly calcium and iron.

4. Polished rice has been shown in these experiments to be deficient in the following vitamins of the B_2 complex : pyridoxin (B_6), riboflavin, pantothenic acid, and choline.

5. The clinical picture of dry beriberi as it occurs on a rice diet with its nerve and cord degeneration and muscular atrophy is caused by a complicated vitamin deficiency including at least all of the above vitamins." *H. Harold Scott.*

WILLIAMS (Ray D.), MASON (Harold L.), POWER (Marschelle H.) & WILDER (Russell M.). **Induced Thiamine (Vitamin B_1) Deficiency in Man. Relation of Depletion of Thiamine to Development of Biochemical Defect and of Polyneuropathy.**—*Arch. Intern. Med.* 1943. Jan. Vol. 71. No. 1. pp. 38–53. With 4 figs. [Refs. in footnotes.]

This records the fourth of a series of studies from the Mayo Clinic of the effects of diets containing a restricted amount of thiamin, but otherwise ample. The level of restriction in this case was planned to be intermediate between those of previous experiments, and two women volunteers were given a diet that provided only 0·1 mgm. of thiamin per thousand calories: every two weeks a test dose of 1·0 mgm. of thiamin hydrochloride was administered subcutaneously so that the average daily intake was raised to 0·175 mgm. thiamin per thousand calories.

As a result of several years' work the authors consider that determination of the percentages of pyruvic acid, lactic acid and glucose in the blood after oral or intravenous administration of glucose appear to give the most reliable tests for the estimation of the probable severity of the metabolic defect in states of uncomplicated thiamin deficiency. They use this "metabolic load test" here, but point out that it is not specific for, nor pathognomonic of, thiamin deficiency.

The fortnightly dose of 1·0 mgm. of thiamin served not only as a test dose for urinary excretion but also as a "partial periodic cure" allowing the experiment to continue for a much longer period because of the improvement of appetite and activity for some days after each injection.

Symptoms and signs of deficiency appeared by the thirtieth day of restriction, when a decrease of the ordinary urinary excretion of thiamin was recorded: twenty days later urinary excretion of thiamin after a test dose was reduced. From this time abnormally high values for pyruvic acid and lactic acid were found in the blood after giving glucose. About this time also anorexia and weakness became more marked and the subjects complained of paraesthesia of the legs. Clear evidence of nervous damage was present after 110 days and consisted of defects of sensation, loss of tendon reflexes and paralysis of the muscles in the legs.

The experiment was stopped after 120 days because one subject had a severe neurological defect and the other less severe defects, and because the appetites of both had failed and inanition seemed imminent. The administration of large doses of thiamin largely cured the biochemical defect within a week, and the appetite and strength returned rapidly. The neurological defects, however, responded much more slowly and in one subject were incompletely restored after four months of continuous treatment.

Experimentally, polyneuropathy has been a manifestation of late severe deficiency of thiamin, and the anatomical defect has been only slowly reversible even when thiamin hydrochloride has been administered intensively. *H. E. Harding.*

GOLDSMITH (Grace A.). **The Incidence and Recognition of Riboflavin and Niacin Deficiency in Medical Diseases.**—*Southern Med. Jl.* 1943. Feb. Vol. 36. No. 2. pp. 108–116. [20 refs.]

A previous survey in New Orleans covering 5,776 adolescents in schools demonstrated a marked lack of good nutrition. Good nutrition was found in only 11·2 per cent. of white and 3·3 per cent. coloured individuals; fairly good nutrition in 59·6 per cent. white and 38·1 coloured; deficient nutrition in 29·2 white and 58·6 coloured.

In Louisiana among farming families the figures were 1·22 good, 69·28 fair and 29·49 deficient nutrition.

It is believed that any organic or functional disturbance leading to poor absorption, improper utilization, increased excretion or increased requirement may produce vitamin deficiency syndromes.

Using clinical criteria suggested by the Subcommittee on Medical Nutrition, Division of the Medical Sciences, National Research Council, an examination of 200 patients admitted to the Charity Hospital, New Orleans, and aged 5 to 82 years, was made for signs and symptoms believed to be due to deficiencies of riboflavin or nicotinic acid [which the Americans now call niacin]. Forty per cent. of those examined exhibited what was considered to be definite evidence, and 67 per cent. probable evidence, of deficiency of riboflavin or of nicotinic acid or both. Most of the cases occurred among those suffering from gastro-intestinal disease, arteriosclerosis, cardiac and malignant disease.

[The possibility of detecting minor vitamin deficiencies is a subject of considerable interest, the recognition of certain well marked syndromes may present little difficulty, but the interpretation of the same syndromes when incomplete, or of individual signs or symptoms, may be a matter fraught with difficulties perhaps not always recognized except by those who have carried out wide observations. The author has recognized this in regard to circum-corneal vascular injection but the same is true of other signs. Much observation and correlation with experimental investigations is still required before any very certain pronouncement can be made.] *H. S. Stannus.*

MACHELLA (Thomas E.) & MCDONALD (P. Robb). **Studies of the Vitamins in the Human Subject. VI. Failure of Riboflavin Therapy in Patients with the Accepted Picture of Riboflavin Deficiency.**—*Amer. Jl. Med. Sci.* 1943. Feb. Vol. 205. No. 2. pp. 214–223. [27 refs.]

"Certain subjective and objective clinical disturbances have been reported to disappear when the vitamin is administered," a syndrome to which the name "Ariboflavinosis" has appeared in medical literature as a result. The authors review the literature on the subject and summarize personal experiences in the treatment with riboflavin of some of the lesions attributed to its deficiency. The clinical phenomena discussed include (1) cheilosis; (2) the seborrhoeic type of dermatitis; (3) vascularizing keratitis; (4) the specific form of glossitis; (5) pemphigus, and the authors show how considerable has been the lack of close agreement among various writers upon a number of points. Their own material consists of 20 subjects; of these three had more than one lesion: one had (1), (3) and (4); two had (1) and (4); nine had (3); five had (1); six had (4); four had (5).

Test treatment consisted in the administration of riboflavin 2 mgm. thrice daily for one or two weeks, with increased doses subsequently in some cases and 1 cc. dilute hydrochloric acid at meals to those with achlorhydria. It was shown that the riboflavin was an active preparation and by testing the urine that it was absorbed In only a single case was some subjective improvement noted. Later all the lip and tongue conditions cleared up with brewer's yeast. *H. S. Stannus.*

VENOMS AND ANTIVENENES.

SCHÖTTLER (W. H. A.). Untersuchungen ueber Toxikologie und Serologie der europäischen Ophiotoxine. [**Study of the Toxicology and Serology of European Snake-Venoms.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1942. Sept. 26. Vol. 124. No. 2. pp. 141–163. [32 refs.]

The author starts by saying that there are certain analogies between bacteria and snake venoms, in that both are toxic and both have antigenic structure. [This seems to be too broad a statement to lead to anything of value and among his conclusions the author states that a uniform method of testing venoms and sera on the lines usual in bacterial investigations is not yet available]. He tested the venoms of 32 viperine snakes, including several specimens of *V. ammodytes*, *V. aspis*, *V. berus*, *V. lebetina*, *V. ursinii*, *V. latasti* and *Ancistrodon halys* captured in their natural haunts, using mice as his experimental animals and several specific monovalent and polyvalent antivenenes. He estimated the M.L.D. (the smallest amount of toxin per 10 gm. mouse which would cause death), the M.T.D. (minimum tolerated dose, *i.e.* the largest amount the animal can receive and recover from) and the C.L.D. (the smallest quantity which will kill all the mice in an experiment). He found quite marked differences in the constitution of the toxin and its antigenic structure even in specimens of a single species captured in the same place ; at the same time various species contained several antigenic constituents in common. Antivenenes on the market differed to no small extent in their neutralizing potency, the best—though even that was far from satisfactory—being the antiviperine serum from the Zagreb Institute of Hygiene. Against the venoms of snakes of Albania, Switzerland, East Prussia and Esthonia no antivenenes are prepared, a matter which it would be well to remedy. *H. Harold Scott.*

KAUER (George L.), Jr., BIRD (Robert M.) & REZNIKOFF (Paul). **The Clotting Action of Fer-de-Lance Venom.**—*Amer. Jl. Med. Sci.* 1943. Jan. Vol. 205. No. 1. pp. 16–24. With 2 figs. [11 refs.]

EAGLE has found that the venom of *Bothrops atrox* (Fer-de-lance) has an enzyme action converting prothrombin to thrombin and fibrinogen to fibrin. It also contains powerful haemorrhagins and neurotoxins which restrict its use as a coagulant. A " detoxified " (but not

non-toxic) product was obtained in 1939 which clotted well but whose haemolytic and neurotoxic effects were reduced. A study has been made of this product to determine its use in haemorrhagic conditions, comparing it with stock venom, *i.e.* the crude dried venom. The "detoxified venom" was prepared by shaking a 1 per cent. solution of the stock venom for 48 hours with an equal volume of chloroform, and evaporating the supernatant fluid.

First, *in vitro* experiments on the clotting effect of the venom on whole blood were made, using serial dilutions of the stock and the detoxified venoms, and oxalated and heparinized blood. The stock proved a more rapid coagulant than the detoxified, and oxalated blood coagulated more rapidly than did heparinized blood. The effect of adding venom to a clear dilute fibrinogen solution was the formation of a cloudy gel-like fibrin clot, which lyses at a rate dependent on the concentration of venom.

In vivo experiments were performed on white rabbits and small dogs. In the former no change in clotting time was observed, nor did local haemorrhage occur after subcutaneous injection of even 0·1 cc. of 1 per cent. detoxified venom. Intravenous injection into rabbits caused an increase in coagulation time with a decrease in fibrinogen, so dogs were then used as experimental animals. After injection of 1–2 cc. of 1 per cent. venom, stock or detoxified, the dogs were gasping and vomiting, and showed relaxation of sphincters, opisthotonus, respiratory paralysis aud cardiac asystole, and died in 2 to 30 minutes. Post mortem, there was found engorgement of the vessels of the viscera; there were no clots in the heart or large vessels and no fibrin deposits seen microscopically. With small doses, 0·1 cc. of 1 per cent. detoxified venom diluted to 10 cc. with saline, injected intravenously, the dogs survived, after showing only mild toxic signs and no shortening of coagulation time.

The venom thus had a marked coagulating effect *in vitro* and a marked anti-coagulating action *in vivo*, indicating two factors, and attempts were made to develop an antivenom which would neutralize the anti-coagulating factor and one was obtained by injection into rabbits.

Injection of venom together with this antivenom resulted in the clotting time remaining within the normal range while the prothrombin and fibrinogen fell by 40 per cent. The venom given without the antivenom resulted in the clotting time being indefinitely prolonged and the prothrombin and fibrinogen fell to zero.

Other experiments were undertaken to determine the coagulant action of dog's plasma drawn after intravenous injection of venom and it appeared to be due to the contained venom.

The difference between the clotting effect of the venom of the Fer-de-lance on whole blood *in vitro* and *in vivo* was very puzzling—coagulating and fibrinolytic (anti-coagulating) in the former, and anti-coagulating only in the latter, in dogs. This difference is not yet explained. The rabbit antivenom serum nullifies the clotting action of the venom *in vitro* and protects dogs against an intravenous injection of venom which, without it, would prove fatal.

H. Harold Scott.

DERMATOLOGY AND FUNGOUS DISEASES.

HEMPHILL (James E.) & NOOJIN (Ray O.). **North American Cutaneous Blastomycosis treated with Superficial Roentgen Therapy. A Report of Four Cases.**—*Amer. Jl. Roentgenology.* 1942. Nov. Vol. 48. No. 5. pp. 643–650. With 18 figs. (9 coloured). [35 refs.]

"Superficial roentgen therapy, in conjunction with medical measures . . ., stops activity within the spreading borders, eliminates secondary infection, and hastens regression of the chronic inflammatory reaction. The sooner roentgen therapy is started, the less deforming will be the scar . . . It embraces all the principles of superficial roentgen therapy for inflammations, and probably acts as a stimulatory agent to the local tissue resistance promoting repair through scarring. After as little as 300 r is given the entire inflammatory process changes and the pathological picture becomes one of definite healing through fibrosis and regeneration of epithelium.

"Small doses of superficial roentgen rays, 100 kv., constant potential, 8 ma. (inherent oil filtration equivalent to 3 mm. Al.), half-value layer 3·20 mm. Al, measured in air, without backscatter, and half-value layer 3·40 mm. Al, with backscatter, were used in our cases. . . . Ideal roentgen therapy should be a series of single treatments of 75–100 r per treatment, administered at weekly or ten day intervals, for a total dosage sufficient to produce smoothing of the borders and remove signs of activity . . . 1,500 r or less should be adequate." The paper details some four cases, and ends on a note of caution. It is stressed that iodides and ray therapy together may be unavailing, especially in deep lesions with bone involvement. The illustrations are very small. *Sydney Thomson.*

BECKER (B. J. P.). **A Preliminary Report on "Habaswein Itch."**—*East African Med. Jl.* 1943. Feb. Vol. 20. No. 2. pp. 49–51.

The name designates a condition widely prevalent in the Northern Frontier District of Kenya. It has an indefinite periodicity, and is far more common in Europeans than in Africans. "The primary lesions are a type of dermatitis herpetiformis" (*sic*) and appear anywhere on the body. Erythematous patches, papules, "myriads" of small vesicles arranged in groups, pustules and occasional bullae complete the picture. The lesions themselves last for three to five days and show periods of relative quiescence and exacerbation. Their disappearance often leaves minute pigmented areas but the eruption is subject to constant recurrence. The secondary lesions have all the characteristics of urticaria and angioneurotic oedema. Experimental observations included the search for pathogenic micro-organisms, the consideration of Tyroglyphus mites (cheese-borers) obtained from patches of grass, and investigation of the action of pollens, bark dusts, soil, etc. Ultimately caterpillar hairs were placed on damp skin and signs of irritation ensued, with tiny vesicles developing after 12 hours. The reaction took six days to disappear. Apparently the same results were obtained from different caterpillars and no attempt is here made to identify the various species. *Sydney Thomson.*

MISCELLANEOUS.

BULLETIN DE L'INSTITUT D'HYGIÈNE DU MAROC. 1941. N.S. Vol. 1. pp. 79–131.—Rapport sur l'activité des Services de la Direction de la Santé Publique et de l'Assistance pendant l'année 1941. [**Public Health Services in Morocco during 1941.**]

JACKSON (W. P.). **The Airplane, a Possible Means of Transmission of Disease.**—*Virginia Med. Monthly.* 1942. Jan. Vol. 69. p. 29. [Summary prepared for *War Medicine.* Chicago.]

Extensive development of aviation has two great disadvantages: its use as a destructive implement of warfare, and its danger of conveying infectious diseases, such as cholera, plague, smallpox, typhus, yellow fever, malaria and dengue. The incubation periods of these diseases vary from two days to two weeks; therefore, a pilot or a traveler can easily become infected before departure and break out with the disease a day or so after reaching his destination. During the incubation period he can be a dangerous carrier of the disease. It has been proved that airplanes transport mosquitoes, house flies and other insects.

The prevalence of insects in the cabins of aircraft depends on whether the airdrome is on land or on water and the distance it is from shore. Mosquitoes are not disturbed by drafts of air when resting under seats, baggage compartments and the like. Interior disinfection of aircraft is insufficient, because mosquitoes and other insects may find safe harborage in the space between the outer and the inner linings of the aircraft, in the hollow wings, in the space for retracted under-carriage and in various grooves and rivet holes.

Fortunately, up to the present time there has not been a serious spread of disease by airplanes. Findlay suggested this possibility in the recent eastward spread of yellow fever from endemic zones in West Africa to the Southern Sudan. After the arrival at Muroc, Calif., of a group of military planes from South America by way of Panama Schlotthauer reported four cases of an acute illness produced by the bite of an insect previously unknown to residents of the Mojave Desert. Study identified this insect as Paratriatoma hirsutus Barber, a member of the family of blood-sucking vectors of the organisms causing American trypanosomiasis and commonly encountered in South America. Yellow fever should be given some special consideration because of its possible transmission not only by Aedes aegypti but by twenty-two other species of mosquitoes, certain flies, bedbugs, ticks and cockroaches. Dengue is also transmitted mechanically by two types of Aedes, including A. aegypti and possibly two others, so that a dengue "reservoir" may be found in uninhabited jungle areas. Malaria, it is said by Simmons, exceeds all other infectious diseases in sapping the vitality and impeding the social, industrial and political progress of the inhabitants of many tropical countries. While Anopheles quadrimaculatus is thought of as the vector, there are at least eight other species of the Anopheles group that have different modes and location of habitation. Recent discoveries have introduced new problems: search for still unknown vectors and hosts of jungle infections, methods of protecting exposed persons and precautions against the spread of these diseases from infested centers.

The author quotes Kolmer, who says: "Once any of these become epidemic in the United States it is probable and possible that our own various insects may become conveyors or vectors of the organisms from animal to man or man to animal."

To prevent the spread of these infections the countries concerned have adopted certain general precautions: systematic destruction of mosquitoes on all airplanes, vaccination of all flying personnel and careful inspections of passengers to eliminate those who are infected. The Pan-American Sanitary Code, in addition to this, agrees to present certificates which show where passengers have embarked and where they have deplaned and also the localities that they visited six days prior to a given embarkation. Such a certificate is not required of a passenger if his trip originated in a latitude south of 30 degrees south, unless he has deplaned for more than one day north of this latitude.

For destruction of mosquitoes in aircraft to be effectual a suitable sprayer and insecticide (which is highly toxic to insects, innocuous to passengers, noninflammable, noncorrosive, nonstaining, stable in all climates and readily miscible with water) is essential. Water-soluble pyrethrum concentrate diluted ten to fourteen times with water immediately before spraying is commonly used. About 30 cc. of a 1 : 15 solution per thousand cubic feet (28 cubic meters) of space is sprayed by a nebulizer. The plane is sprayed about a half hour before landing, and its ventilators are closed for about ten minutes after spraying. Airplanes may be fumigated and opened prior to the embarkation of passengers.

In addition to the vaccination of the flying personnel, it is wise for all passengers intending to travel by air through yellow fever areas to be inoculated. Protection begins about a week after inoculation and is fully developed in about three weeks, and the immunity, which is effective against urban and jungle types of the disease, lasts about two years. A third precaution, the medical inspection of passengers, their care and surveillance of contacts, is the most difficult to carry out.

Certain special measures are adopted if plague, cholera, typhus or smallpox are encountered or suspected: (1) the aircraft is cleaned thoroughly; (2) the passengers and crew are examined; (3) any person showing symptoms of any one of these diseases is excluded, and (4) the personal effects of the personnel are inspected if necessary. If plague is found, the following additional measures are used: immediate disembarkation of the sick person; surveillance of contacts and suspects for not more than six days; disinfection and disinsectization of personal effects, and deratization. For cholera the same measures are used as for plague except that the period of surveillance is five days and the drinking water is disinfected and the containers emptied and disinfected. In addition, the unloading of fresh fish, shellfish, fruit and vegetables is banned. This is also true if the airplane has come from a cholera-infested area. For typhus the measures are the same except that delousing is done and the period of surveillance is twelve days. For smallpox vaccination and surveillance for no more than fourteen days are carried out.

Commander Jackson concludes that careful regulations under the direction of thorough and competent health officers with adequate equipment and personnel may be the sum and substance of controlling a condition that has tremendous potentialities for spreading disease and death.

DAQGETT (W. J.). **Desquamative Otitis Externa in Malta.**—*Jl. Laryngology & Otology.* 1942. Oct. Vol. 57. No. 10. pp. 427–446. With 2 charts & 1 fig.

The author deals with a well-defined condition met with in hot humid climates, which he calls "desquamative otitis externa." It occurs in several forms, which have been classified by MORLEY as (1) acute; (2) subacute; (3) chronic; (4) relapsing. These are but different stages of one disease.

A clear clinical picture can be seen in a patient whose symptoms have lasted for about two weeks. He complains of tenderness when the ear is pressed or moved, and there is a variable amount of deafness. He loses sleep because of throbbing when he gets warm, and there is a mild degree of cervical adenitis. Examination reveals a swollen tender meatus, in the depths of which—usually obstructing the drum—is a soft mass of desquamated detritus consisting of epithelial scales, pus cells and organisms. This cheesy mass is easily wiped away leaving a red, angry and occasionally bleeding surface beneath. The drum is injected and "swollen" and, when there is loss of surface epithelium, it is not uncommon to see what appears to be an area of granulations. Differential diagnosis is between furunculosis, mastoiditis and eczema.

The incidence is seasonal, the disease being very common in the hot summer months and virtually disappearing in winter. Bacteriologically, the chief findings are diphtheroids together with *Proteus*, *Ps. pyocyanea* or *Staph. albus*. The diphtheroids, however profuse, are the first to disappear as a case reacts to treatment. No new light is thrown on causation—though swimming as an aetiological factor is discredited.

A series of 164 cases has been investigated in Malta, and a satisfactory line of treatment evolved. It is essential to have a first-class source of illumination and a forehead mirror. Treatment is based on (*a*) careful cleansing under direct vision, (*b*) astringent wicks impregnated with the following solution:—lead acetate gr. x, Burow's Solution (Liq. Aluminii Acetat.) ʒi, Aq. Menth. pip. ℥i, (*c*) insufflation of Brilliant Green ½ to 1 per cent. in boric acid powder.

Possible causes of disappointing reaction to treatment are discussed.

[This is a valuable survey of a condition which, although not dangerous, interferes with efficiency.] *E. D. Dalziel Dickson.*

DETINOVA (T. S.). [**On the Biology of Mosquitoes of the Genus Aëdes.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1942. Vol. 11. No. 3. pp. 44–52. [In Russian.]

The author describes the results of studies on the gonotrophic cycle of species of *Aëdes* found in the vicinity of Moscow, which proved to have much in common with *Anopheles*.

In all newly emerged female Aëdes, the ovaries are undeveloped, their maturation proceeding at the expense of a carbohydrate and blood diet, and not by utilizing food reserves within the body itself. The subsequent behaviour of the female Aëdes is governed by gonotrophic harmony which in this genus is more perfect than in Anopheles: whereas in the latter the ingestion of a partial blood meal results in a uniformly incomplete development of the follicles in all the egg-tubes, in the former it leads to a complete development of part

of the follicles, the number of developed follicles being proportional to the amount of blood taken in. This distinction is correlated with differences in the prey: while *Anopheles maculipennis* attacks large mammals, Aëdes hunts small game—birds and lower mammals. It is more difficult to obtain a full meal from a mouse or bird than from a cow and, therefore, it is in the interest of the species that the female should be capable of laying eggs after an incomplete meal.

The lower fertility of Aëdes, as compared with that of *Anopheles maculipennis*, is compensated by considerable longevity and repeated oviposition. With age the ovarian follicles of Aëdes undergo gradual degeneration, on account of which a large percentage of females caught in the autumn are sterile, their ovaries being devoid of normal eggs. [See also BEKLEMISHEV, above, p. 511, for a study of *A. maculipennis*.] *C. A. Hoare.*

DOLMATOVA (A. V.). [**The Life-Cycle of** *Phlebotomus papatasi*.]—*Med. Parasit. & Parasitic Dis.* Moscow. 1942. Vol. 11. No. 3. pp. 52–70. With 8 figs. [In Russian.]

The author describes the imaginal part of the life-cycle of *Phlebotomus papatasi*, investigated in Stalinabad [Middle Asia].

All the vital functions of the sandfly are governed by the rule of gonotrophic harmony and are correlated with the gonotrophic cycles, as in the case of Anopheles. *P. papatasi* hibernates in the larval stage and not as an imago; the seasonal changes in its gonotrophic cycle are, therefore, like those of *A. bifurcatus* and *A. plumbeus*. Towards autumn the females do not fatten but the lowering of the temperature brings about deviations from complete gonotrophic harmony. As in Aëdes, the ingestion of a partial blood meal by the sandfly leads to the maturation of an incomplete batch of eggs.

Thus the blood-sucking Culicidae and Psychodidae have a similar life-cycle, the main characteristic of which is the necessity and sufficiency of one full blood meal for the maturation and laying of a single complete batch of eggs. In Stalinabad the majority (ca. 80 per cent.) of female sandflies pass through one gonotrophic cycle only. Their low fertility (20–80 eggs) is compensated, on the one hand, by reduced mortality during the first cycle (when it is not necessary to undertake long flights), and, on the other hand, by the sheltered life of the larvae.

The life-history of *P. papatasi* is of some epidemiological importance. In spite of its short life-cycle, it is an efficient vector of sandfly fever, owing to the transmission of the virus to the ova. As regards its rôle in leishmaniasis, only those females which have a second blood meal (ca. 20 per cent.) are of any importance as vectors. Therefore, the efficiency of this species in the transmission of leishmaniasis depends on its abundance and other favourable conditions. *C. A. Hoare.*

MANINE (A.). Un cas de myiase oculaire à *Oestrus ovis* Linné dans le Sahara central (Fort-Flatters, Sahara constantinois). [**Ocular Myiasis due to** *O. ovis* **in Central Sahara.**]—*Arch. Inst. Pasteur d'Algérie.* 1941. June. Vol. 19. No. 2. pp. 287–289.

PÉDOYA (C.). Un cas de myiase oculaire à *Oestrus ovis* à Beni Ounif (Sud oranais). [**Ocular Myiasis due to** *O. ovis* **in Southern Oran.**]—*Arch. Inst. Pasteur d'Algérie.* 1941. Sept. Vol. 19. No. 3. pp. 362–363.

STABILE (Américo). Sobre miasis de la vulva. [**Myiasis of the Vulva.**]—*Arch. Uruguayos de Med., Cirug. y Especialidades.* 1942. Aug. Vol. 21. No. 2. pp. 187–198. With 4 figs. [11 refs.]

DE MEILLON (Botha). **A Toxin from the Eggs of South African Ticks.**—*South African Jl. Med. Sci.* 1942. Nov., Vol. 7. No. 4. pp. 226–235. With 2 charts & 3 figs. on 1 plate.

MILLS (C. A.) & SCHMIDT (L. H.). **Environmental Temperatures and Resistance to Infection.**—*Amer. Jl. Trop. Med.* 1942. Nov. Vol. 22. No. 6. pp. 655–660. With 1 fig. [10 refs.]

Various statistical studies have indicated that human resistance to infection is highest in cool middle temperate latitudes and is lowest in warm tropical areas. Whilst previously published work has shown that this has seemed to hold for tuberculosis, leprosy, acute rheumatic fever and acute nephritis, it has appeared that, in order to be considered seriously, the general implications needed corroboration by carefully controlled investigations on experimental animals. Such investigations are described in the present paper.

Young white mice were placed in experimental chambers, some of which were maintained at a temperature of 90°–91°F., with 60–70 per cent. relative humidity, whilst the others were kept at a temperature of 66°–68°F. Three weeks or more of adaptation to these temperatures were allowed before any other experimental procedure was instituted. Earlier workers have shown that the major part of metabolic adaptation to change in environmental temperature takes place in the second and third weeks, with relatively minor alterations thereafter. Although animal growth is quite regularly depressed in moist heat, such retardation has barely begun at the end of three weeks. Thus the animals in the hot and cold chambers were of similar weight when used, *i.e.* between 18–22 grammes.

At the end of the adaptation period 179 mice from the hot rooms and 172 from the cold were inoculated intraperitoneally with Type I pneumococcus (strain McGovern). Plate counts showed the inoculum to contain approximately 60 viable organisms. Injections were made at ordinary laboratory temperatures, but the mice were replaced immediately into their respective chambers. Hourly observations of deaths were made from the 20th to the 32nd hour, and every two hours from thence to the end of the 4th day.

There were sharp differences in survival time of the two groups, as practically all hot room mice died before any of those in the cold succumbed. Those from the cold room had a mean survival time of $44{\cdot}91 \pm 0{\cdot}11$ hours, while for the hot room mice this value was only $27{\cdot}54 \pm 0{\cdot}15$ hours, a difference which was highly significant. As body temperature differences in the mice might have altered the growth rate of the injected organisms and thus accounted for the observed differences in survival time, deep rectal temperatures were measured in 30 mice from each room. Mean values of $99{\cdot}26° \pm 0{\cdot}08°$ and $99{\cdot}91 \pm 0{\cdot}06$°F. were found for the cold and hot room groups respectively. While this 0·6°F. difference is mathematically significant, it is of such low order that its influence upon the growth of pneumococci would probably be negligible.

Production of protective antibodies was studied in three different series of mice adapted to heat and cold as already described. Various dilutions of heat-killed culture of Type I pneumococcus were injected

intraperitoneally; 4 to 10 days later varying numbers of the homologous living organisms were injected similarly and the animals observed for 72 hours. No striking differences were found in the protection afforded by the vaccine, although in almost every pair of groups there were a few more survivors among the cold room mice. Application of the chi-square test showed, however, that any difference was significant. Further series of mice from the two environments were injected with Type I anti-pneumococcus serum (rabbit) and immediately thereafter inoculated with living Type I pneumococci. No significant difference was found between the hot and cold room animals; antibody requirement was the same for both groups.

In summarizing, the authors indicate that further studies now in progress point to a reduction in phagocytic activity as probably the dominant factor in the lowered resistance brought about by environmental warmth. *C. G. Warner.*

HENSCHKE (U.). Sonnenschutzmittel. [**Protection against the Sun.**] —*Deut. Militärarzt.* 1942. Sept. Vol. 7. No. 9. pp. 581–589. With 3 figs.

The experience of the Africa Corps has emphasized the need for the protection of troops against the effects of sun's radiation. Different bands of the sun's radiation react in different ways on the human being and protection from the harmful wave-lengths is achieved mainly either by their absorption or reflection.

The danger from infra-red radiation lies in its heating effect, and the consequent production of sunstroke or heatstroke. These maladies are of such frequency of occurrence as to merit serious attention to protective measures. The wearing of suitable clothing is one method of protection against infra-red radiation; owing to the highly reflective quality of this wave-length under appropriate conditions, the colour of the cloth and the type of dye used are important. In this respect it is suggested that khaki uniform is not to be commended.

The sun's visible radiation (wave length $0{\cdot}76$–$0{\cdot}40\mu$) is as harmful to health as the infra-red. It can cause blinding—in winter sports centres, for example, the reflection from ice and snow of the sun's light gives rise to snow-blindness—and also set up a skin irritation. A certain degree of protection to the eyes against blinding can be achieved by means of suitable peaks on caps, but complete safety is assured only by the use of sun glasses. For cases of skin irritation arising from sensitivity to light it is necessary to cover the skin with a thin layer of paste or ointment capable of filtering out the harmful rays.

The danger from ultra-violet radiation (wave length under $0{\cdot}40\mu$) consists mainly in the production of erythema, and experience during the past year has shown that there appear to be two different kinds of skin reaction—one in which the erythema is followed by pigmentation and the other in which direct pigmentation takes place. The erythema, which is caused by a wave length of about $0{\cdot}315\mu$, appears in about two to six hours after the exposure. One of the oldest known methods of protection against sunburn is the use of tannin. This has an extremely favourable absorption curve for ultra-violet radiation but a disadvantage is its colouring effect on the skin. A 5 per cent. solution of tannic acid in water, when applied to the skin, gives adequate protection from the erythema producing rays, whilst there is also a high degree of filtering of the wave length causing direct pigmentation.

Recently, however, a number of preparations have been tried which, while possessing the filtering efficiency of tannin, do not stain the skin. Lists of these preparations—many of them proprietary ointments and lotions—are given in tabular form, and they are graded according as they offer protection from (i) ultra-violet radiation and visible light, or (ii) infra-red radiation, ultra-violet radiation and visible light. The following are typical of the preparations that have been found successful under these two headings. Protection from ultra-violet radiation and visible light is given by the creams known as Delial-H, Ultra-Zeozon and Antilux. For protection from infra-red and ultra-violet radiations and visible light the following preparations have proved efficacious: a 7 per cent. phenyl salicylate ointment, yellow vaseline, Engadina-U.V. ointment and Nivea-Ultra Cream. The filtering efficiencies of these preparations have been determined in terms of the application to the skin of a film of standard thickness of 0·01 mm. For adequate protection from the erythema-producing wave lengths, it has been decided, that in the case of an ointment, 85 per cent. of the radiation intensity should be filtered off, whilst for lotions the figure should be 90 per cent. If, however, particularly strong radiation is being encountered, the proportions of intensity to be filtered off for ointments and lotions should be 93 and 98 per cent. respectively.

C. G. Warner.

BOOK REVIEW.

CILENTO (Raphael) [Kt., M.D., B.S. (Adel.), D.T.M. & H. (Eng.), F.R.San.I. (Lond.), etc.] [Compiled by]. **Tropical Diseases in Australasia. A Handbook.** Second Edition, Revised.—pp. xii+461. With 33 figs. 1942. Brisbane: W. R. Smith & Paterson Pty. Ltd. [Price not stated.]

The second edition of this book is a considerable improvement on the first; it is longer by 90 pages, and most of the additions made are in small type. This increase in size has been made largely through the introduction of new material, representing advances in knowledge since the time of preparation of the first edition, but it also represents a greater tendency to discussion of debatable subjects than was previously evident. This tendency is to be welcomed. There are also several new sections:—an addendum on psittacosis, a section on flagellate dysentery and food poisoning, a section on heat stroke, and Appendix B, an account, in 26 pages, of the arthropod vectors of disease, in which are given keys to Australian anophelines and rat fleas, as well as notes on the differentiation of culicines.

With minor variations the order of subjects remains essentially unchanged. Malaria and blackwater fever occupy first place, and the account has been much improved, especially in the section on treatment. Dengue and Q fever are described more minutely than before, and it is evident that local experience has been relied upon for the information given; this has resulted in a freshness of writing which carries considerable conviction. As would be expected, the work is best in those chapters which deal with diseases important in Australasia; the war has sharpened the interest in Northern Australia and New Guinea. Nevertheless, most of the diseases which are of only secondary importance to Australasia have received attention, and additions,

bringing the accounts up to date, have been made to the sections on leptospirosis, plague, cholera, bacillary dysentery, ankylostomiasis, epidemic dropsy, sprue and leprosy. The sulphonamides receive due acknowledgment throughout.

There is little to criticize; perhaps the only dogmatic and (in the opinion of the reviewer) erroneous view the author adopts is his acceptance of the Monilia theory of prickly heat. He has written the book from the point of view of Australasia, and his emphasis has therefore (and rightly) been placed on those diseases which mainly affect the Continent and its islands. That being so, a reader cannot expect more than a brief reference to the bacteriology of cholera or the epizoology of sylvatic plague. The author supplies, in concise form, the kind of information which students and practitioners in Australasia will need, and the book will be of undoubted benefit to members of the Forces, of all nations, called upon to serve there.

Australian medical men have added much to medical science, and the author does justice to the work, among others, of Joseph BANCROFT and his son T. L. BANCROFT on the transmission of *W. bancrofti*, of BURNET on Q fever, of LEE on heat stroke and of KELLAWAY, FELDBERG, TRETHEWIE and FAIRLEY on snake poisons. His own experience in New Guinea has stood him in good stead.

A number of good illustrations have been added and are to be commended. *C. W.*

We record with great regret the death on May 30th, 1943, of Lieut.-Colonel A. G. McKENDRICK, M.B., D.Sc., F.R.C.P.E., F.R.S.E., I.M.S. (retd.), who was a Sectional Editor of the *Tropical Diseases Bulletin* from 1924 to the time of his death.

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